

## ABSTRACT

Title of Dissertation: MODALS AND THEIR COMPLEMENTS IN DUTCH AND BEYOND

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In this dissertation I investigate the syntax and semantics of modals like *can* and *must* and their counterparts in other languages. Modals like *can* and *must* can be used to express both obligations (as in *employees **must** wash their hands*, called *deontic* modality) and possibilities given what is known (as in *John **must** be home; his car isn't in the parking lot*, called *epistemic* modality), but previous work shows that the availability of these different 'flavors' of modality are constrained by their syntactic environment. My main claim is that in all languages discussed, modal meanings are specifically restricted by their *complement size*. For English modals, which are treated as functional items that are part of the functional projections from the verb, this is often captured by having modals appear in different positions in the functional projection of the verb based on their modal flavor: Epistemic modals are

located high, above tense, while non-epistemic modals, such as deontics, are located low, below aspect (Cinque 1999, Hacquard 2006, 2008, a.o.).

I argue that in Dutch, modals are verbs (following Aelbrecht 2010), and as such, they host their own functional projections. Despite this, some of the same syntactic restrictions on the availability of modal flavor hold, which argues for a recasting of the cross-linguistic generalizations not in terms of position of the functional projection, but in terms of complement size. I claim that cross-linguistically, different flavors require different types of complements: epistemics need a complement the size of a Tense Phrase (in line with Cinque 1999, Hacquard 2006), deontics need the size of an Aspectual Phrase (building on Rubinstein 2012), while other non-epistemics can combine with a smaller-sized complement.

I will provide two case studies in favor of the claim that complement size restricts the availability of modal flavors: In chapter 3, I will discuss the interaction between tense and modality, and in chapter 4, I will discuss the case of modals with non-verbal complements.

MODALS AND THEIR COMPLEMENTS IN DUTCH AND BEYOND

by

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## Chapter 1: Introduction

Modals can be used to talk about what *should* be the case, or what *could* have happened, instead of what *is*. They are used to express *displacement* into the realm of possibilities. Modals can belong to different lexical categories. There are modal verbs, like English *seem* (1), which syntactically behaves like a regular English verb. There are modal adverbs and adjectives, like English *possibly* and *necessary* (2), which syntactically behave like regular English adverbs and adjectives. And then there are modals like English *can* and *must*, and Dutch *moeten* 'must' and *kunnen* 'can', whose behavior is more idiosyncratic. As we will see, they share properties with verbs like *seem*, but at the same time, they diverge from regular verbs in morphological, syntactic, and semantic ways.

- (1) Mary *seems* to be home.
- (2) a. Mary is *possibly* home.  
b. It is *necessary* for you to go home.
- (3) a. Mary *could* be home.  
b. Marie *kan* thuis zijn.  
*Mary can home be*  
'Mary could be home.'

One interesting property about modals like *can* and *must*, and *kunnen* and *moeten*, is that they can be used to express a variety of modal meanings. The modal *must* in a sentence like (4) can be used for instance to express a necessity given what

is known (*epistemic* modality (4i)), an obligation (*deontic* modality, (4ii)), or a necessity given a certain goal (*teleological* modality, (4iii)). In light of this meaning flexibility, Kratzer (1977, 1981, 1991) asked the question in her seminal work on modals, how many different *musts* do we want to posit? If each meaning corresponds to a different *must*, we end up with a multitude of *musts*. What is more, this multitude of meanings does not only hold for English *must*, but also for other English modals (5), as well as for modals in other languages (6).

- (4) Mary *must* eat vegetables.
- (i) 'Mary is necessarily a vegetable eater.' epistemic
  - (ii) 'Mary is obliged to eat vegetables.' deontic
  - (iii) 'Mary needs to eat vegetables [to stay healthy].' teleological
- (5) Mary *could/may* eat vegetables.
- 'It is possible/allowed for Mary to eat vegetables.' epistemic, deontic, teleological
- (6) Marie *hoeft* geen groenten te eten.
- Mary needs no vegetables to eat*
- 'Mary does not need to eat vegetables.' epistemic, deontic, teleological

As an alternative to a multitude of *musts*, Kratzer (1977:342) argues that there is one *must*, and likewise, one *could*, one *may*, and one *hoeven* 'need'. In its core, *must* expresses necessity, but the context determines what kind of necessity. The various contexts given in (7) can indeed disambiguate the meanings of *must* in (4i)-(4iii).

- (7) (i) '(In view of what we know,) Mary must eat vegetables.' epistemic

- |  |              |
|--|--------------|
| (ii) ' <i>In view of the rules,</i> ) Mary must eat vegetables.'     | deontic      |
| (iii) ' <i>In view of Mary's goals,</i> ) Mary must eat vegetables.' | teleological |

An equally influential line of work in modal research argues that it is not *just* the context that constrains the interpretation of sentences like (4)-(6). There are syntactic environments in which not all flavors are available at all, regardless of the context they are in (Ross 1969, Brennan 1993, Barbiers 1995, Cinque 1999, Condoravdi 2002, Hacquard 2006, Rubinstein 2012, Veselinović 2019, a.o.). In particular, the literature highlights a major distinction between epistemics and non-epistemics (grouped under the label 'root'), in terms of how they interact with elements like tense. What is more, since comparisons across multiple languages have shown that these syntactic environments are similar cross-linguistically, it has been claimed that the syntactic restrictions on modal flavor are principled and universal (Cinque 1999, Hacquard 2006). Cinque for instance proposes that modals are part of the functional projection of a verb, and appear in fixed positions, depending on flavor: epistemic modals appear in a functional projection above Tense, root modals in one below tense.

In this thesis, I will continue the second line of research and investigate how syntactic factors restrict the availability of modal flavors a modal verb or auxiliary can express. In what follows, I will discuss two restrictions on modal flavor that have been argued to hold cross-linguistically. I will provide new data from Dutch, which is a language that on the surface seems to be an exception to the generalizations. My claim is that Dutch is not in fact an exception, but that the new data show that the generalizations need to be recast from their original formulations.

I will argue that Dutch modals such as *moeten* 'must' differ from English modals like *must* in that they are *verbs* (Aelbrecht 2010), as opposed to *functional items*. Since they are verbs, Dutch modals host their own functional projections. This will have consequences, notably, on how modals interact with tense in Dutch vs. other languages such as English. But while the lexical status of a modal is subject to cross-linguistic variation, I will argue that languages nonetheless converge in terms of flavor restrictions based on the type of *complement* the modal takes. Whether modals are functional items or verbs, I will argue that in all languages discussed, epistemic modals combine with a Tense Phrase (in line with Cinque 1999, Hacquard 2006), deontics combine with an Aspectual Phrase (building on Rubinstein 2012), while other non-epistemics can combine with a smaller-sized complement. This captures the syntactic restrictions on modal flavor that seem to hold cross-linguistically.

### 1.1. Restriction #1: The temporal interpretation of epistemic vs. root modals

One of the restrictions on modal flavor most thoroughly discussed in the literature is the interaction between tense and modality (Groenendijk & Stokhof 1975:68-69, Iatridou 1990, Condoravdi 2002, Stowell 2004, Hacquard 2006, von Stechow & Gillies 2007, Laca 2008, Rullmann & Matthewson 2018, a.o.). One debate concerns whether, cross-linguistically, epistemics and roots pattern similar with respect to their interaction with tense, or whether there is a (syntactic) restriction that distinguishes epistemics from roots. Groenendijk & Stokhof (1975:68-69), Iatridou (1990), Cinque (1999), Condoravdi (2002), Stowell (2004), Hacquard (2006, 2010), Laca (2008) argue in favor of the latter, as they provide evidence that roots scope under tense while epistemics scope over tense. von Stechow & Gillies (2007), Rullmann &

Matthewson (2012, 2018) on the other hand argue in favor of the former, as they claim that both roots and epistemics scope under tense.

Here I will show that the interaction between tense and modality is particularly interesting in Dutch, as Dutch epistemics seem to both scope above *and* below tense. Does this mean that Dutch falsifies either hypothesis concerning a cross-linguistically uniform scopal relation between tense and modals? I will first argue that there is a syntactic difference between Dutch modals and modals in other languages upon which the generalizations are made, which explains why Dutch epistemic modals can scope under tense: Dutch modals are *verbs*, and not *functional items*. As such, Dutch modals host their own functional projections (FPs), and they can thus scope below the tense of their clause, irrespective of their flavor (8a). Then, I will argue that Dutch epistemic modals can scope *over* tense because cross-linguistically, epistemics select for a *Tense Phrase complement* (8b). This makes epistemic modal sentences in Dutch biclausal. While Dutch modals thus seem to be able to scope both over and under tense, there are in fact two tenses with which Dutch epistemic modals interact: Dutch epistemic modals can scope under tense, namely, the tense of their own clause, and they can scope over tense, namely, the tense of their complement.

- (8) a. [**TP tense**    [**vP modal**    [TP tense    [vP verb]]]] option 1: tense > epi  
       b. [TP tense    [**vP modal**    [**TP tense**    [vP verb]]]] option 2: epi > tense

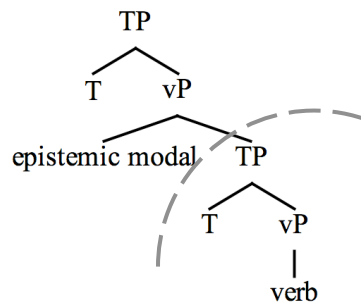
In a language like English, however, I will follow Cinque's proposal that modals are functional elements that appear in a monoclausal structure with the verb: Functional modals are located in a functional projection above the verb phrase and do

not project their own tense (9). Since there is only one tense in these sentences, they can only scope *over* tense, namely, the tense of their complement.

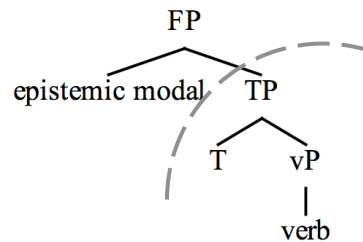
- (9) [FP modal [TP tense [vP verb]]] option 1: epi > tense

I thus claim that while languages differ in the lexical status of their modals (e.g., a verb in Dutch, a functional item in English), I claim that what ties epistemic modals together is the type of *complement* that they take (10) (indicated by the dashed line) (see also Ramchand 2014, Ramchand & Svenonius 2014): Regardless of whether epistemic modals are verbal or functional, epistemics scope over the tense of their complement (in line with Cinque 1999, Hacquard 2006; contra Rullmann & Matthewson 2018).

(10) a. epistemic modal verbs



b. epistemic functional modals



In what follows I will spell out the summary given above in further detail. First, on the surface, modals that bear tense morphology, such as *have to* in English and *moeten* in Dutch, seem to scope below tense. And indeed, non-epistemic modals (also called 'root'), such as the deontics in (11) are interpreted in the scope of tense:

The interpretations of the past tense modals in (11) are of obligations that held at some point in the past. Note that the semi-modal *had to* is used to demonstrate the interaction in English, as English modal auxiliaries such as *must* do not carry tense morphology; all Dutch modals however carry tense morphology.

- (11) a. John **had to** be home at 10, since his parents told him so. *deontic*  
 b. Marie **moest** om 10 uur thuis zijn van haar ouders *deontic*  
*Mary must.PST at 10 hour home be from her parents*  
 'Mary's parents obliged her to be home by 10.'

Some researchers have argued that *epistemic* modals in contrast outscope tense (Groenendijk & Stokhof 1975:68-69, Iatridou 1990, Stowell 2004, Hacquard 2006, 2010, 2011 and Hacquard & Cournane 2016, a.o.). The crucial datapoints involve the interpretation of past tensed epistemics, since two possible orderings of the scope-bearing elements are in principle available. The epistemic modal could scope *under* tense, giving a sentence like (12) the interpretation of a *past* necessity (12i) (a past “*temporal perspective*”, using Condoravdi’s 2002 terms), or the epistemic modal could scope *over* tense, locating the evaluation time of the modal at the local time of evaluation, which in matrix sentences is speech time. The sentence would thus be interpreted as a *current* necessity (12ii) (a present *temporal perspective*) about a past state of affairs.

- (12) John **had to** be home, since his car wasn't in the parking lot.  
 Option i. 'Given what is known, it *was* necessary that John was home.'



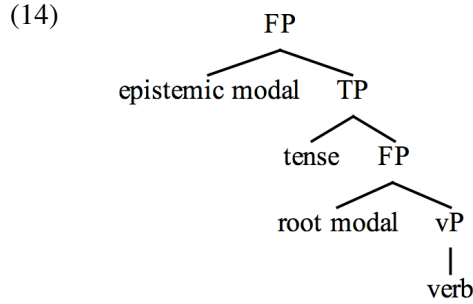
Option ii. 'Given what is known, it *is* necessary that John was home.'

Stowell (2004) provides data with *could* and *had to* to support the claim that English modals scope *above* tense, and thus, that sentences like (12) are interpreted as in option ii. In the context I added to Stowell's example in (13), the interpretation is that “given the evidence available at the time of speech, it *is* necessary that there were at least a hundred people at that party last night”.

(13) (Context: two speakers discussing how many people were at a party last night)

There *had to* be at least a hundred people there. (Stowell 2004:626)

Similar contrasts between root and epistemic modals have been claimed for languages besides English (French, Hacquard 2006, Laca 2008; Dutch, Ter Beek 2010; Bosnian-Croatian-Serbian, Veselinović 2019; Una, Louwerse 1988 in Cinque 1999, a.o.), which have lead researchers to hypothesize that there is a universal ordering between modals and tense. While epistemic modals and root modals are both in a functional projection (FP) above the verb phrase (vP), epistemic modals are located structurally higher than roots, namely, in a functional projection above tense in the Tense Phrase (TP). This captures the data in (11)-(13), as epistemic modals scope *over* tense, while root modals scope *under* tense (14).



However, von Fintel & Gillies (2007) and Rullmann & Matthewson (2012, 2018) argue against the cross-linguistic generalization in (14). Rullmann & Matthewson (2018:326) claim that sentences with *had to* as in (12) in which the modal has the interpretation of a current possibility (option (ii)), are “marginal at best”. They also provide examples such as (15), in which the epistemic modal instead seems to scope *under* tense. In these sentences, the epistemic modal is evaluated at a time preceding speech time, as indicated by the discourse context ("When Susan arrived at Bob's house"). Going back to the proponents of the generalization in (14), Hacquard (2016), following Boogaart's (2007) suggestion<sup>1</sup>, claims that sentences like (15) are not counterexamples to this generalization as the past involved in examples similar to (15) is not a true backshifting past, but a kind of narrative past. In (15), the local time of evaluation is set back to a salient past time by the discourse. The epistemic modal is evaluated *at* this local time of evaluation, and not backshifted to it. This means that the epistemic modal is not interpreted in the scope of a true past tense.

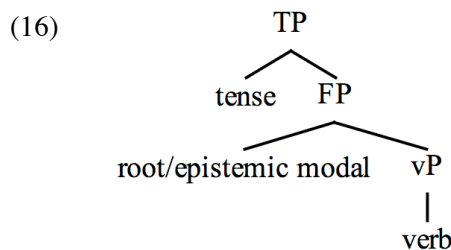
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<sup>1</sup> Boogaart (2007) however claims that in this case, the past is a true backshifting past.

<sup>2</sup> Thanks to Alexander Williams for asking me to clarify this point.

- (15) When Susan arrived at Bob's house, she saw that the place was packed. There **had to** be at least a hundred people there. But she found out later that actually, there were only 60. (Rullmann & Matthewson 2018:298)

Based on further data from English, Dutch, Gitk'san and St'at'imcets, which I will discuss in chapter 3, Rullmann & Matthewson (2018) claim that “typically tense scopes above the modal” (Rullmann & Matthewson 2018:284) (though they leave some room for epistemic adverbial modals). They thus claim that the scope position of epistemic modals relative to tense is identical to root modals, as shown in (16).



Because of the disagreement about the data, I ran a quantitative study that tests whether epistemic modals like *have to* scope over or under tense. The experiment, reported on in chapter 3, supports the claim that English epistemic modals do not scope under tense outside of contexts like (15). While more research is necessary, the results seem to be in line with a difference between roots and epistemics (14) and not in line with a uniform account of roots and epistemics (16).

For Dutch modals, examples (17)-(18) support the claim that epistemics can scope both *over* and *under* tense. For (17), the interpretation is one of a necessity scoping over past, similar to (13) above (see Ter Beek 2008 and chapter 2 & 3 for more examples of epistemics scoping over past, including tentative support from an online

experiment; note however that Boogaart 2007 and Rullmann & Matthewson 2018 claim that this interpretation is not available). In (18), in contrast, the necessity is evaluated at a past time, which the speaker contrasts with speech time (*but the new evidence indicates...*) (Aelbrecht 2010). Note moreover that a reanalysis of (18) along the lines of the English example in (15) above is unavailable: In contrast to (15), which occurs within a past tense discourse, (18) does not need any context. As such, the past tense on *moest* in (18) is indeed backshifting the evaluation time of the modal.

(17) (Context: A detective is looking at a call history)

De verdachte **moest** gisteravond dus wel bereik hebben.

*the suspect must.PST last.night thus PRT cell.service have*

‘Given what is known, it is necessary that the suspect had cell service last night.’

(18) Gisteren **moest** hij nog in Portugal geweest zijn op zijn verjaardag, maar het

*yesterday must.PST he still in Portugal been be on his birthday but the*

nieuwe bewijsmateriaal toont aan dat dat een foute conclusie was.

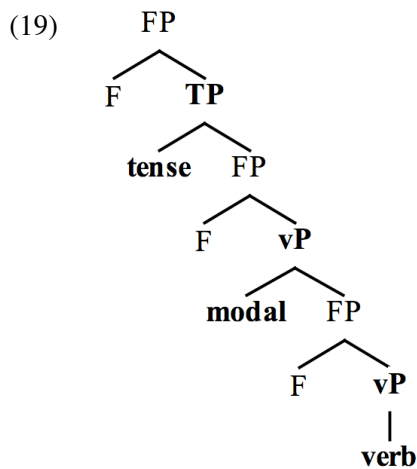
*new evidence shows on that that a wrong conclusion was*

‘Yesterday it was still necessarily the case that he had been in Portugal on his birthday, but the new evidence indicates that that conclusion was wrong.’

(Aelbrecht 2010:34, my translation)

Does the available scopal relation for Dutch epistemics exemplified in (17)-(18) mean that the generalization in (14) or (16) does not hold for Dutch, and that there is no potential universal ordering between tense and modality? My claim is that there is

a cross-linguistically uniform generalization, but that Dutch shows the need for a recasting of the generalization as it stands. I claim that Dutch modals are *verbs*, items inside a verb phrase that project their own set of functional projections (19) (in line with den Dikken & Hoekstra 1997, Barbiers 2005, Aelbrecht 2010, Broekhuis & Corver 2015, Rullmann & Matthewson 2018; but see Haeseryn et al. 1997, Ijbema 2001 and Van Riemsdijk 2002 for an analysis of Dutch modals as auxiliaries, similar to English; see chapter 2). Since modals in (19) involve their own set of functional projections, including a tense projection, modals in a structure like (19) are expected to always be able to scope *under* tense, namely, the tense of their own clause.



The structure in (19) explains why epistemic modals can scope under tense in Dutch. But why can Dutch epistemics also scope *over* tense? This, I claim, is part of the cross-linguistic generalization that separates epistemics from roots (Cinque 1999, Hacquard 2006). In (14), this generalization was stated in terms of the ordering of functional projections, with epistemic modals being located in a functional projection higher than tense, and root modals being located in a functional projection below tense. As it stands, this generalization does not include Dutch modal verbs, or modal

verbs from any other language, since modal verbs are not located in a functional projection. We can however recast the statement in (14) in terms of *complement type*: What functional modals and modal verbs have in common is that with an epistemic flavor, they combine with a *tensed* complement, and thus scope over tense, namely, the tense of their complement. Root modals, in contrast, take an untensed complement and therefore never scope over tense.

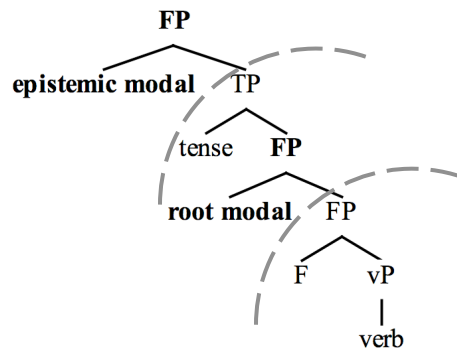
**Generalization:** Modals combine with different sizes of complements depending on their modal flavor, namely:

- *epistemic* modals combine with a Tense Phrase (Cinque 1999, Hacquard 2006)
- *root* modals combine with smaller phrases.

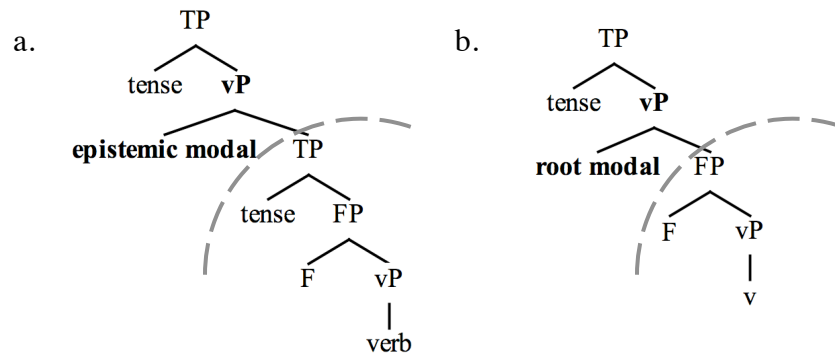
As a result, we end up with two different structures for modals cross-linguistically (20)-(21), which nonetheless share important similarities: Functional modals are inside a functional projection above the verb phrase (20), and they form a monoclausal structure with the main verb. When the modal has an epistemic flavor, the functional modal is in a functional projection above tense, and when the modal has a root flavor, it is in a projection below tense. This explains the tense data in a language like English. Modal verbs, on the other hand, are verbs inside a verb phrase and project their own functional projections, among which is tense (21). This opens up the possibility for a biclausal structure: Modal verbs project their own tense phrase, and if they take a tensed complement, that makes the sentence biclausal. I argue that this is the case when modal verbs have an epistemic flavor (21a). This explains the tense data in a language like Dutch: Dutch epistemic modal verbs can

scope under tense, namely, the tense of their own complement, and they can scope over tense, namely, the tense in their complement. Root modal verbs, on the other hand, take an untensed complement (in section 1.2. I will claim they take an Aspectual Phrase, an AspP), which explains why they only scope under tense: Root modal sentences do not contain two TPs, and thus, root modals can only scope under the tense of their own clause (21b).

(20) functional modals



(21) modal verbs



So, while modals can occur in two different structures cross-linguistically, I claim that what ties the modals together is the type of *complement* that epistemic and root modals take (see also Ramchand 2014, Ramchand & Svenonius 2014): Epistemic

modals take a TP-complement, while root modals take a smaller complement that notably does not include tense. This crucial similarity is indicated by the dashed lines in (20)-(21).

Since I claim that cross-linguistically, epistemic modals take a complement that contains tense, one prediction immediately follows<sup>2</sup>: I do not expect to find languages in which the *only* option is for epistemic modals to scope under tense, irrespective of whether that modal is a verb or a functional item. After all, for functional modals this would mean that the modal is located in a functional projection lower than tense (22); for modal verbs this would mean that the complement does not contain tense (23). Either way, the complement would not be a Tense Phrase.

(22) \* [TP tense      **[FP epistemic modal    [vP verb]]]**

(23) \* [TP tense      **[vP epistemic modal    [vP verb]]]**

### 1.2. Restriction #2: Deontics vs. teleologicals (Rubinstein 2012)

So far, I have treated root modals as a uniform class. It appears, however, that there is a syntactic restriction on the different subflavors of root modality as well. Rubinstein (2012) investigates modals that can take nominal complements besides infinitival complements, such as English *need* (24) and claims that depending on the type of complement, different subflavors of root modality are available.

(24)    a. John needs to drink some water.

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<sup>2</sup> Thanks to Alexander Williams for asking me to clarify this point.



b. John needs some water.

I will compare Rubinstein's data to the phenomenon of Dutch modals taking non-verbal complements (Barbiers 1995, van Riemsdijk 2002) and show that Dutch here as well provides evidence that modal flavor is constrained by complement size. First, I claim that the generalization stated above, that epistemic modals need a TP complement but root modals do not, explains one cross-linguistic restriction on modals with non-verbal complements, namely, that they cannot be used to express an epistemic flavor (Barbiers 1995). Second, I will argue that Dutch further supports Rubinstein's (2012) claim that there is a syntactic restriction on modal flavor *within* the category of root modals: Deontic modals, in contrast to teleological modals, are limited to verbal complements.

The first restriction on modals with non-verbal complements is shown in (25). When a Dutch modal combines with an NP, PP, or AP-complement, an epistemic flavor is unavailable for the modal, and only root (non-epistemic) flavors are available. So, while sentence (25a) can mean 'Given what is known, it is necessarily the case that my grandparents have a fence', sentence (25b) cannot have this meaning (Barbiers 1995).

- (25) a. Mijn grootouders moeten een hek hebben. ✓epistemic, ✓deontic, ✓teleological  
*my grandparents must a fence have*  
'My grandparents need to/must have a fence.'
- b. Mijn grootouders moeten een hek. \*epistemic, ✓deontic, ✓teleological  
*my grandparents must a fence*

'My grandparents need to/must have a fence.'

If epistemic modals need a TP-complement, as I claimed in section 1.1., it seems to follow that the modal in the sentence in (25b) cannot be used to express an epistemic modal flavor. The complement does not contain a verb, let alone a tense, and therefore, the complement is too small for an epistemic flavor to arise (Eide 2003; see Barbiers 1995, Constantinescu et al. 2012 for alternative explanations).

The second restriction on modals with non-verbal complements is within the category of root modals. Based on data from Hebrew, Hindi-Urdu, and English *need*, Rubinstein (2012) claims that modals that can be used to express both a deontic and a teleological flavor when they combine with a verbal complement can only be used to express a teleological flavor when they combine with an NP-complement. Note that Rubinstein does not discuss other non-epistemic flavors of modals, which is why I focus on these two flavors as well; in chapter 5 I will briefly discuss bouletic and ability modals.

**Generalization:** Modals combine with different sizes of complements depending on

their modal flavor, namely:

- *deontics* combine with a verbal complement<sup>3</sup> (Rubinstein 2012)
- *teleologicals* can combine with an NP-complement

The contrast for Hebrew is shown in (26). The context in (26) forces a deontic interpretation since the neighbor and their speaker are *required* to get a fence (deontic

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<sup>3</sup> I will slightly modify this statement below.

modality), even though they do not *need* it (teleological modality). In this context, the Hebrew modal *χayav* 'must' with a verbal complement is judged as true (26a), but the same modal with an NP-complement is judged as false (26b). This shows that *χayav* 'must' with a non-verbal complement cannot have a deontic interpretation (Rubinstein 2012:163).

(26) City regulations mandate that home owners put up fences between their properties.

You and your neighbor get along very well without a fence. In fact, both of you object to a fence because it would have to go right on top of the beautiful flower beds that have been flourishing between your two properties. You say to your neighbor:

a. *χayav-im livnot kan gader.*                      ✓epistemic, ✓deontic, ✓teleological

*must-M.PL build.INF here fence*

'A fence needs to be built here.'

b. *χayav-im kan gader.*                      \*epistemic, \*deontic, ✓teleological

*must-M.PL here fence*

'We need a fence here.'

Note, however, that Dutch modals with non-verbal complements can have a deontic flavor. The sentence in (27), repeated from (25b), is judged true in the context in (26).

(27) *Mijn grootouders moeten een hek.*                      \*epistemic, ✓deontic, ✓teleological

*my grandparents must a fence*

'My grandparents need to/must have a fence.'

Does this mean that Dutch falsifies the generalization made by Rubinstein? I argue that it does not. Despite surface differences, I claim that Dutch fits in with the generalization that deontic modals need a verbal complement, as the complement in (27) is underlyingly verbal. Extending van Riemsdijk's (2002, 2009) analysis for Dutch modals with a PP-complement, I will argue in chapter 4 that all modals with non-verbal complements in Dutch contain an unpronounced verb in their complement (van Dooren 2017). So, while the surface strings in Dutch (27) and Hebrew (26b) are similar, I will show that the underlying structure of the Dutch sentence is like (28), containing a verbal complement with a covert verb *hebben* 'have' (28).

- (28) Mijn grootouders moeten een hek HEBBEN. \*epistemic, ✓deontic, ✓teleological  
*my grandparents must a fence have*  
 'My grandparents need to/must have a fence.'

Given the analysis in (28), the question arises anew as to why Dutch modals with apparent non-verbal complements do not give rise to an epistemic flavor. Since I claim that the underlying structure of sentences like *my grandparents must a fence* is as in (28), with an underlying silent infinitive, there does not seem to be a difference between modals with overt verbs. And yet, the epistemic flavor is only available when the embedded verb is overt. Here, I will show that while the complement in (28) is verbal, and in fact, is as large as an Aspectual Phrase, an AspP (section 1.4. and chapter 2), it is not big enough to license an epistemic flavor: An Aspectual

Phrase crucially is still smaller than a TP (30) (Cinque 1999) and as such, the complement is not big enough for an epistemic flavor to arise (29).

(29) Mijn grootouders moeten [AspP [vP een hek HEBBEN].

*my grandparents must a fence have*

'My grandparents need to/must have a fence.'

(30) [TP tense [AspP aspect [vP verb ]]]

### 1.3. Intermediate summary

In sum, we see that Dutch modal flavor is restricted by syntax, similar to modals in other languages. Initially, the exact restrictions seemed to be different from the languages upon which the restrictions were based: Dutch epistemic modals can scope both *over* and *under* tense, in contrast to English and French, and Dutch modals with non-verbal complements can be used to express a deontic flavor, in contrast to Hebrew. In this dissertation, I argue that a cross-linguistically uniform picture still emerges, with modal flavor being restricted by their complement size:

**Generalization:** Modals combine with different sizes of complements depending on

their modal flavor, namely:

- *epistemic* modals combine with a TP; (Cinque 1999, Hacquard 2006)
- *root* modals combine with smaller phrases: (Rubinstein 2012)
  - *deontics* combine with an AspP
  - *teleologicals* (and possibly other flavors) can combine with even smaller phrases (NPs)

These generalizations, combined with the claim that Dutch modals are verbs as opposed to functional items, explain the Dutch data: Dutch epistemics can scope over tense because of the generalization above, and they can scope under tense because they are verbs that project their own set of functional projections. Dutch modals with non-verbal complements are limited to root flavors because the complement is too small for an epistemic modal. Finally, despite appearances, Dutch modals with non-verbal complements take a complement the size of an Aspectual Phrase, containing a covert verb, and as such can be used to express a deontic flavor.

What Dutch modals highlight is that appearances can be deceiving. Modals with apparent non-verbal complements fall into two categories, those with and without a covert verb, which correlate with the availability of a deontic modal flavor. Verbal complements, in my proposal, are deceiving too, in line with Cinque (1999), Hacquard (2006, 2010), a.o., who claim that epistemics scope above tense and roots below: The same string in (31), has a different underlying structure depending on whether the modal expresses an epistemic (31a) or a root modal flavor (31b).

(31) Marie **moet** groenten eten.

*Mary must vegetables eat*

'Mary must eat vegetables.'

- |    |                              |                               |                          |
|----|------------------------------|-------------------------------|--------------------------|
| a. | [Marie <sub>t</sub> [vP moet | [TP <i>t</i> groenten eten]   | epistemic; TP-complement |
| b. | [Marie <sub>t</sub> [vP moet | [AspP <i>t</i> groenten eten] | root; AspP-complement    |

A question that I will leave for further research is what happens when modals take a CP-complement (Rubinstein 2012 for Hebrew, Aelbrecht 2010 for Dutch, Veselinović 2019 for Bosnian-Croatian-Serbian (BCS)). In many languages, among which is Dutch, modals can take what looks like a CP-complement (325a). In a language like BCS, this has in fact been argued to be the only possible complement for epistemic modals (32b) (Veselinović 2019). Does this mean I have to change the generalization concerning the complements of epistemics to '*at least* a TP', leaving open the option that epistemics take a complement larger than a TP? Cross-linguistically, the data seems more complex than just that, with Hebrew modals with CP-complements being limited to a teleological modal flavor (32c) (Rubinstein 2012). The absence of an epistemic flavor in (32c) speaks against a generalization that epistemics can take either a TP or a CP. For this reason, I will leave modals with CP-complements out of this dissertation, though see chapter 5 for some further observations.

- (32) a. Het moest haast wel [CP dat Charlotte de cake had opgegeten]. Dutch  
*it must.PST almost prt that Charlotte the cake had up.eaten*  
 'It almost had to be the case that Charlotte had eaten the cake.' (epistemic)  
 (Aelbrecht 2010:42)
- b. Mora-Ø bi-ti [CP da je Ana u biblioteci] BCS  
*must-3SG.PRS be-INF DA be.IPF.PRS.3SG Ana in library*  
 'Ana must be in the library.' (epistemic) (Veselinović 2019:51)
- c. Xayav-im [CP Se-tihye kan gader]. Hebrew  
*must-M.PL that-be.Fut.F.SG here fence*

‘A fence is needed here.’

(teleological) (Rubinstein 2012: 172)

In the next and final section of this chapter, I will discuss the implications of the findings for current theories on modality. This chapter started out with Kratzer's (1977) call to restrict the multitude of modal meanings by appealing to the context. The data discussed above is however inconsistent with merely one *must* or one *moeten*, as the different modal flavors are linked to different complements. Instead of one *must* or one *moeten*, I need to postulate three lexical entries per modal per language in order to capture these syntactic restrictions on modal flavor: There is an epistemic modal that combines with a TP, a root modal that combines with an AspP, and a root modal that takes a non-verbal complement (if available in the language). The role of context, which is front and center in Kratzer's analysis, will be limited, as the distinction between roots and epistemics is wired in. The different subflavors for root modals (deontic, teleological, bouletic) could however still be determined by the context, to avoid an 'explosion of meanings' (Schaffer 2011).

#### 1.4. Different modal flavors, different complement sizes

This chapter started out with the tension between the call for a unified analysis of a modal like *must* (Kratzer 1977, 1981) and the recognition that different modal flavors appear in different syntactic structures (Ross 1969, Brennan 1993, Barbiers 1995, Cinque 1999, Condoravdi 2002, Hacquard 2006, Rubinstein 2012, Veselinović 2019, a.o.). After a brief introduction to the Kratzerian framework, I will provide denotations for modals, which will be specified for both flavor and complement type: each modal word will include an epistemic entry for epistemic meanings, which takes



a TP-complement (a proposition), and a root entry for deontic and other root meanings, which takes an AspP (a predicate of times). Since the exact size of truly non-verbal complements (which are reserved for non deontic root meanings) is still under debate (see chapter 4), I will not provide the third lexical entry here. While I will abandon a unified account for modals, I will be able to adopt Kratzer's context-dependency *within* subflavors.

#### 1.4.1. Introduction to the Kratzerian framework

As a starting point, I will provide a short introduction to Kratzer's unified analysis of modals (Kratzer 1977, 1981, 1991). What is the meaning of a modal like *must* or *can*? Following insights from modal logic (Carnap 1957, Kripke 1963, a.o.), modals are treated as quantifiers over possible worlds, where each possible world can be viewed as a 'way things could have been' (Lewis 1977). Necessity modals, such as *must* and *have to*, are analyzed as universal quantifiers, while possibility modals, such as *can* and *may*, are analyzed as existential quantifiers. The set of worlds that these modals quantify over is determined by an accessibility relation: a deontic accessibility relation provides worlds compatible with certain laws, while an epistemic accessibility relation provides worlds compatible with what is known. Under this view, modals share a semantic template.

In her seminal papers, Kratzer (1981, 1991) proposed that epistemic and root modals could share the same lexical entry: there could be just one *must* and just one *can*, which are lexically specified for force, but where their domain of quantification (the worlds traditionally picked by an accessibility relation) would be provided by context via what she called "conversational backgrounds".

Kratzer identifies two types of conversational backgrounds: a *modal base*, which determines an initial set of worlds, and an *ordering source*, which imposes an ordering on this set of worlds. The modals end up quantifying over the best worlds of the modal base, given the ordering imposed by the ordering source (33).<sup>4</sup>

(33) For any world  $w$ , and conversational backgrounds  $f, g$ :

$$[[\text{must}]]^{w,f,g} = \lambda p . \forall w' \text{ most ideal worlds given } g(w) (\cap f(w)): p(w')$$

$$[[\text{can}]]^{w,f,g} = \lambda p . \exists w' \text{ most ideal worlds given } g(w) (\cap f(w)): p(w')$$

Epistemic flavors arise from an epistemic modal base, which picks out worlds compatible with what is known, while root flavors arise from a circumstantial modal base, which picks out worlds compatible with the circumstances. Different subflavors of root modality follow from different ordering sources, which provide ideals: A deontic ordering source can for instance pick out the most ideal of the worlds relative to a set of laws.

#### 1.4.2. Distinguishing root and epistemic lexical and functional modals

In Kratzer's analysis, modals can always have an epistemic, deontic, teleological, or any other flavor irrespective of the syntactic environment that the modal occurs in. This unified account is thus not compatible with my thesis. Based on the data provided above, my proposal is that modal flavor is in part dependent on the type of complement the modals combine with. Modals can only have an epistemic flavor if

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<sup>4</sup> For formal implementations of the ordering source, see Kratzer (1981, 1991), Portner (2009).

they combine with a TP-complement, and they can only have a deontic flavor if they combine with an AspP-complement.<sup>5</sup>

- (34) a. [epistemic modal      [TP [AspP [vP verb    ]]]  
       b. [root modal                      [AspP [vP verb    ]]]

Given (34), I need to postulate lexical entries for each modal that are not only specified for force (distinguishing possibility/necessity modals), but also for flavor, and type of complement: TP complements (propositions) for epistemics, and AspP (properties of times) for roots. I also need to distinguish modals that are verbal (i.e., predicates of events in the Davidsonian tradition), as in Dutch, and modals that are functional, as in English.

While modal flavor is constrained by their type of complement, there can still be a role for context: a modal that takes VP complement can express different kinds of root meanings (deontic or teleological), and even different kinds of deontic or teleological meanings. A sentence like ‘Mary must eat vegetables’ can be understood as a necessity relative to her needs, the needs of her parents, the orders of her doctor or her nutrition coach. I thus propose to hard-wire a particular modal base for each lexical entry, but to still keep Kratzer’s ordering source.

The lexical entry for a functional epistemic modal is given in (35): it takes a proposition *p*, and requires that *p* be true in all of the most ideal worlds *w*’ given an

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<sup>5</sup> For a full picture, one further entry needs to be added for teleological modals, which can combine with a smaller complement, which could be an intensional NP or a Small Clause (chapter 4).

ordering source  $g$  amongst those compatible with what is known in the world of evaluation  $w$ .

- (35)  $[[\text{must}_{\text{epi}}]]^{w,g} = \lambda p. \forall w' \text{ most ideal worlds given } g(w) \text{ of those compatible with what is known in } w: p(w')$

The entry for its lexical equivalent (epistemic *moeten*) is provided in (36): I treat lexical modals as predicates of events (Homer 2011), in the Davidsonian tradition, and as such they take an event argument.

- (36)  $[[\text{moeten}_{\text{epi}}]]^{w,g} = \lambda e. \lambda p. e \text{ is a necessity in } w \ \& \ \forall w' \text{ most ideal worlds given } g(w) \text{ of those compatible with what is known in } w: p(w')$

The lexical entries for root modals need to encode that they combine with a complement smaller than a TP. Rubinstein's generalization (Rubinstein 2012) speaks of a vP-complement, as deontics need a complement that contains a *verb*. There is evidence that roots combine with a complement slightly larger than a vP, however. In sentences like (37), the deontic modal is followed by the auxiliary *have*, which could be an indication of perfect aspect (see chapter 2). I will therefore partially adopt Rullmann & Matthewson's (2018) proposal in that root modals take an Aspectual Phrase (34b). Crucially, as aspect is situated below tense (38) (Cinque 1999), the complement is still smaller than a TP.<sup>6</sup>

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<sup>6</sup> In order to capture actuality entailments in modals, Hacquard (2006, 2010) claims that root modals scope *under* aspect.

(37) Mary **has to have** taken LING200 before she can attend this class. (deontic)

(34) b. [root modal [AspP [vP verb ]]]

(38) [TP tense [AspP aspect [vP verb ]]]

As a meaning category, aspect relates the running time of the vP-event to a reference time, which is provided by tense. Formally, aspect existentially quantifies over a predicate of events, and returns a predicate of times. In my analysis, root modals take this input and return a predicate of times. The entries for root functional and lexical modals are provided in (39). The entry in (39a) gives us the following interpretation for a proposition like 'it must<sub>root</sub> rain': 'it must<sub>root</sub> rain' is true relative to a world  $w$  and an ordering source  $g$  if there is a raining event in all of the most ideal worlds  $w'$  selected by  $g$  that are compatible with the circumstances as evaluated at a time  $t$  in a world  $w$ .

(39) a.  $[[\text{must}_{\text{root}}]]^{w,g} = \lambda P. \lambda t. \forall w' \text{ most ideal worlds given } g(w) \text{ among those compatible with the circumstances in } w: P(w')(t)$

b.  $[[\text{moeten}_{\text{root}}]]^{w,g} = \lambda e. \lambda P. \lambda t. e \text{ is a necessity in } w \ \& \ \forall w' \text{ most ideal worlds given } g(w) \text{ among those compatible with the circumstances in } w: P(w')(t)$

In sum, the four entries in (35)-(36) and (39) are what I will be assuming in this thesis: The difference between functional and lexical modals will explain some of the cross-linguistic differences we find between Dutch and English modals, and the

two entries per modal provide us with the necessary ingredients for linking modal flavor to complement size: In all languages alike, I claim, root and epistemic modals differ in the type of complement they take, which explains the patterns we find across functional and lexical modals.

The entries above do away with Kratzer's unified account (see Ramchand 2014, discussed in the next section, for a unified account based on complement type, with different ontological assumptions), and specify both flavor (modal base) and complement types. This step raises two possible issues. The first is the parsimony concern that initially motivated Kratzer's unified system. The second is a learnability concern. I will discuss both briefly.

First, as Kratzer (1977) famously argues, there are many different types of necessity that a modal like *must* can express: epistemic and deontic necessities relative to all kinds of evidence, rules or regulations. Assuming that each of these correspond to a different lexical entry could lead to an "explosion of flavors" (Schaffer 2011). My proposal requires three different *musts* (one that takes TP complements, one that takes vP complements, and one that takes NP complements), it *only* requires three. I still maintain from Kratzer a role for context to determine an unlimited number of subflavors (see Nauze 2008, Ramchand 2014, Harr 2019 for further discussion).

A second concern that arises with analyses like mine in which modals are specified both for flavor and for type of complement comes from Hacquard (2016) Hacquard & Cournane (2016). They take the perspective of the language learner and ask, what prevents a child from hypothesizing unattested modal flavor/modal syntax

mappings, for instance, that root modals combine with TP-complements? Observing this directly from the input might be difficult, especially when the form of the root and the epistemic modal is identical.

This learnability problem is addressed in two previous accounts that link modal flavors to different syntactic positions. I briefly review related proposals in the next section and then return to how my own account can address the learnability concern.

### 1.5. Implications and comparing proposals

In this final section, I will briefly compare my proposal to three of its predecessors in which tense is also the key ingredient that separates epistemics from roots (Cinque 1999, Hacquard 2006, Ramchand 2014). The proposal that root modals take an untensed complement, while epistemic modals take a tensed complement, is not new: Cinque (1999), Butler (2003), Hacquard (2006), Ramchand (2014), Ramchand & Svenonius (2015) all propose a model of the syntax-semantics interface in which root and epistemic modals are distinguished by means of their interaction with tense.<sup>7</sup> In contrast to Cinque (1999) and Hacquard (2006), who give a proposal based on the structural height of modals, Ramchand (2014) and Ramchand & Svenonius (2014) furthermore also propose that it is the *complement* of the modal that is key in distinguishing modal flavor. What is new in my proposal, besides my specific implementation, is that I motivate my proposal by including modal verbs and

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<sup>7</sup> Other proposals distinguish roots from epistemics based on their argument structure (Ross 1969, Brennan 1993) or their interaction with negation (Coates 1983, Drubig 2001). For an overview, see Hacquard (2011), Barbiers & van Dooren (2017).

functional modals. The similarities across the two types of modals further supports the complement of the modal being the key syntactic restrictor of modal flavor.

I will first review Cinque's (1999) proposal. Based on cross-linguistic data, Cinque (1999) proposes that the difference between root and epistemic modals is part of a hierarchy of functional elements, which includes negation, aspect, tense, and modals, among others. Part of the hierarchy is shown in (40).

- (40) [Mood *speech act* [Mood *evidential* [Modal *epistemic* [T (Past) [T (Future) [Modal *necessity* [Modal *possibility* ... [vP *verb*]]]]]]] (Cinque 1999:106)

What is similar between Cinque's and my proposal is that roots and epistemics behave differently with respect to tense. What is different between my and Cinque's proposal, however, is that Cinque's proposal only concerns functional items heading a functional projection. As such, it has nothing to say about Dutch modals, which I claim are verbal items inside a verbal projection. And yet, the restrictions that Dutch modals obey are eerily similar to functional modals, as we saw in section 1.1. and 1.2. I therefore propose that Cinque's syntactic restrictions on modal flavor be recast in terms of complement size, in a way that they apply to both functional and verbal modals alike.

Hacquard's theory (2006, 2008, 2010) aims at maintaining a unified Kratzerian treatment of modals, but where epistemic and root modals can appear in different positions, without requiring separate lexical entries specified for flavor. In her system, modals are unspecified for flavor, and they are either merged above Tense, or between Aspect and the VP (41). Modals are event, rather than world-



relative: they need to be anchored to an event. This event could either be the VP-event, or the speech event. These different events are able to license different modal bases: While speech events license epistemic modal bases, VP-events do not. This system allows different modal flavors to be associated with different positions without flavor being lexically encoded in the modal's lexical entry.

(41) [CP [FP modal [TP [AspP [FP modal [vP verb ]]]]]]

Hacquard's proposal, like Cinque's, applies to functional modals only, which is why it is not available for Dutch modals. Since Dutch modals are verbs, they are not part of a monoclausal structure.

Ramchand (2014) and Ramchand & Svenonius (2015), finally, propose a unified account for root and epistemic modals that is based on the type of complement the modal takes: there is a single lexical entry for root and epistemic modals, but the different meanings arise from the different complements that the modals take, with epistemics taking Tense Phrase complements and roots taking Aspectual Phrase complements. This proposal is of course very similar to mine, although I assume different lexical entries that are specified for modal flavor and complement type. How is Ramchand (2014) able to maintain a unified account? Ramchand deviates from the standard Kratzerian analysis of modals and argues that modals are not quantifiers over possible worlds, but *choices* over sets of *situations*. Situations are elaborations of events and contain a time and a world parameter. Necessity modals indicate that the situation over which the modal ranges is the only

choice, while possibility modals indicate that it is one choice. Working within the framework of Alternative Semantics (Rooth 1985, a.o.), Ramchand furthermore proposes that the situations for which the parameters have not been set are all 'live alternatives'. Epistemic modals, taking a TP-complement, range over situations for which the time and world parameter have been set. As such, they range over the *polarity* of the event – the alternatives are the event *p* and the event not *p*. Root modals, taking a complement that does not contain tense, range over situations for which the time and world parameter have not been set. As such, they range over a wider range of live alternatives. The context further specifies the subflavor for roots (deontic, teleological, etc.). By introducing the notion of a *situation*, it thus seems possible to have one lexical entry for root and epistemic modals: They both range over situations, while the presence or absence of tense determines the flavor of the modal. For me, a unified account is unavailable since I do not appeal to the notion of a situation: Epistemic modals range over propositions while root modals range over predicates of times. I will leave it for future research to determine whether this deviation from the Kratzerian framework will also work for a unified analysis of modal verbs. One further question I have is whether in this framework the two flavors can truly be distinguished by complement alone - can it be ruled out that modals that take an Aspectual Phrase complement *cannot* have an epistemic interpretation? The live alternatives of the event *p* and the event not *p* seem to be included both when the modal combines with a Tense Phrase and with an Aspectual Phrase.

Both Cinque's, Hacquard's, and Ramchand's proposals can prevent the potential overgeneration problem discussed at the end of the previous section. Recall

that the same string can express both an epistemic or a deontic necessity, but, underlyingly, the modals take different complements: a TP for the former, and an AspP for the latter. How do children figure out the link between modal flavor and modal syntax? What prevents a child from hypothesizing that root modals can take TP-complements? For Hacquard and Ramchand, the link between modal flavor and modal syntax is principled: only certain flavors are available in certain positions. In Hacquard's proposal, for instance, if learners assume that modals are event relative, then they should only get the attested mappings. For Cinque, the mapping follows instead from a fixed universal hierarchy. As a universal, this hierarchy could be something that learners are privy to, and which constrains their hypothesis space for modals.

My proposal here could appeal to something similar to Cinque to get around the overgeneration problem. Part of the goal of this dissertation is to argue that despite superficial differences, languages converge on the same restrictions between modal flavor and modal complement. If the generalizations that I propose hold across all languages, then they may be something that learners expect, and not have to discover.

### 1.6. Outline of the dissertation

At this point, I have shown that Dutch modals fit in with cross-linguistic generalizations made on the restrictions on modal flavor by modal syntax: In Dutch, as in other languages, the syntactic environment determines what subset of flavors a modal like *moeten* 'must' can have. For other languages, such as English, these

correlations have been linked to their special status of functional modals (Cinque 1999, Hacquard 2006). Dutch modals, however, are verbs, and I therefore propose a recasting of the correlations in terms of *complement size* (see also Ramchand 2014, Ramchand & Svenonius 2014): Epistemic modals combine with a large TP-complement, while roots can combine with a smaller sized complement, regardless of their lexical status (verbs vs. functional item). The data on past tense modals provides support for this difference in complement size, and it can explain the flavor restrictions when the modal combines with a non-verbal complement.

In what follows, I will delve into the structure of Dutch modal sentences (chapter 2), where I will argue that Dutch modals are verbs and not functional items. Then, in chapter 3 and 4, I will present the two case studies showing differences between and within root and epistemic modals: In chapter 3 I will discuss the interaction between tense and epistemic modality in English, French, and Dutch, and in chapter 4 I will discuss non-verbal complements of modals in Hebrew, English, and Dutch. In chapter 5 I will conclude with a discussion of the wider implications of my findings.

## Chapter 2: The structure of Dutch modal sentences

There are two main claims to this thesis. I argue that in one sense, Dutch modals like *moeten* 'must' in (1) are different from modals studied in other languages, such as English and French: Dutch modals are genuine verbs, and not functional items. In another sense, however, Dutch modals are similar to modals studied in other languages in that modal flavor (*epistemic* (1i) vs. *deontic* (1ii) vs. *teleological* (1iii)) is restricted by the types of complements that the modal takes.

(1) Marie *moet* groenten eten.

*Mary must vegetables eat.*

- |   |              |
|---|--------------|
| (i) 'Mary is necessarily a vegetable eater.'            | epistemic    |
| (ii) 'Mary is obliged to eat vegetables.'               | deontic      |
| (iii) 'Mary needs to eat vegetables [to stay healthy].' | teleological |

Together, the Dutch data challenge current theories on how modal flavor is restricted by syntax (Cinque 1999, Hacquard 2006), and provide support in favor of alternative restrictions that are based on the modal's *complement size*:

**Generalization:** Modals combine with different sizes of complements depending on their modal flavor, namely:

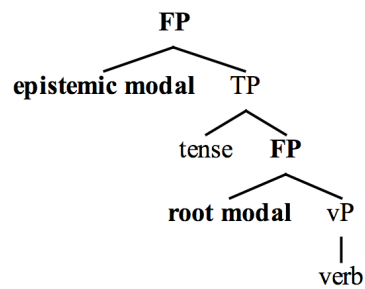
- *epistemics* combine with a Tense Phrase; (Cinque 1999, Hacquard 2006)
- *roots* combine with smaller phrases: (Rubinstein 2012)
  - *deontics* combine with an Aspectual Phrase
  - *teleologicals* (and possibly other flavors) can combine with even smaller phrases

Chapter 3 and 4 deal with the similarities between modals across languages; in this chapter, I will delve into the structure of Dutch modal sentences and show how it differs from the structure of modal sentences in English and French.

There is a debate in the literature as to whether Dutch modals are verbs (Den Dikken & Hoekstra 1997, Aelbrecht 2010, Broekhuis & Corver 2015 claiming on the other hand that Dutch modals are verbs) or auxiliaries (Haeseryn et al. 1997, Ijbema 2001, van Riemsdijk 2002). In this chapter, I will show that Dutch modals are verbal, which will lead to important structural differences with English modals. Why should this matter? According to a Cinquean analysis (Cinque 1999), modals like the English ones are functional elements, and form a monoclausal structure with the main verb (2). Epistemic and root modals appear in different positions in this functional hierarchy, but crucially, for both epistemics and roots, there is just a single clause, with only one tense. If Dutch modals are verbs, however, then they should always occur in the same position: Whether the modal has a root or an epistemic flavor, it hosts its own verbal projection, distinct from the verbal projection of its complement (3). It should also have its own set of functional projections (FPs)

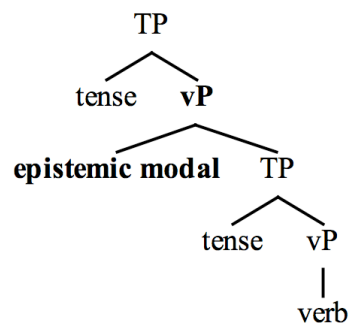
including tense. But this opens up the possibility that Dutch modals involve biclausal structures, if their complements are clausal. And indeed, I will show that Dutch epistemic modals involve biclausal structures, with two distinct tenses: the main clause headed by the modal, with its own tense projection, and a TP complement, also with its own tense (3a). For root modals, I will argue that they too are verbs, but that their complements are smaller, and crucially lack a tense projection (3b). I will argue in section 2.3. that their complement clauses are Aspectual Phrases.<sup>8</sup>

- (1) functional modals (English, French)

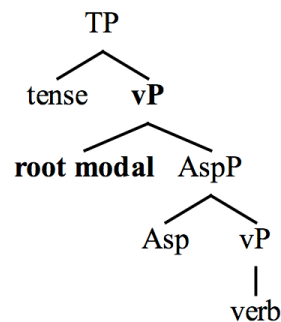


- (2) modal verbs (Dutch)

a.



b.



<sup>8</sup> I am using vP instead of VP, following Kratzer (1996) and the idea that subjects originate in vP. Nothing in my analysis hinges on this distinction.

I thus claim that modals can differ in lexical status cross-linguistically (verb vs. functional item), resulting in two different structures of modal sentences. What ties the modals together is the type of *complement* that they take (see also Ramchand 2014, Ramchand & Svenonius 2014): Regardless of whether modals are verbal or functional, epistemics take a TP-complement, while root modals take a smaller complement.

In section 2.1., I will give a brief overview of some properties of Dutch modals. Then, in section 2.2. and 2.3. I will provide an in-depth analysis of the structure of Dutch modal sentences and argue that Dutch modals are verbs, on both a root and an epistemic flavor.

### 2.1. Dutch modals: similar yet different from English modals

Traditionally, Dutch modals include the six modals in (1) (Haeseryn et al. 1997). They form a somewhat homogenous class from a morpho-syntactic perspective, similar to the English modals *can*, *could*, *must*, *may*, *might*, *shall*, *should*, *will* and *would*. Unlike regular verbs, Dutch modals do not get a second or third person singular inflection (2) (except for *hoeven* 'need'), and unlike other embedding verbs, they take a bare infinitival complement without *te* 'to' (3) (again except for *hoeven* 'need' (3c)).<sup>9</sup>

- |     |                        |                                |
|-----|------------------------|--------------------------------|
| (1) | <i>moeten</i> , 'must' | <i>zullen</i> , 'will', 'must' |
|     | <i>mogen</i> , 'may'   | <i>willen</i> , 'want'         |

---

<sup>9</sup> Note moreover that *hoeven* 'need' is a Negative Polarity Item (NPI) (3c).



	<i>kunnen</i> , 'can'	<i>hoeven</i> , 'need'	
(2)		regular verb <i>rennen</i> 'run'	modal <i>kunnen</i> 'can'
	1 <sup>st</sup> singular	<i>ik ren</i> 'I run'	<i>ik kan</i> 'I can'
	2 <sup>nd</sup> singular	<i>jij ren-t</i> 'you run'	<i>jij kan</i> 'you can'
	3 <sup>rd</sup> singular	<i>hij ren-t</i> 'he runs'	<i>hij kan</i> 'he can'
	1 <sup>st</sup> plural	<i>wij rennen</i> 'we run'	<i>wij kunnen</i> 'we can'
	2 <sup>nd</sup> plural	<i>jullie rennen</i> 'you run'	<i>jullie kunnen</i> 'they can'
	3 <sup>rd</sup> plural	<i>zij rennen</i> 'they run'	<i>zij kunnen</i> 'you can'
(3)	a. Marie <b>probeert</b> dat <b>te</b> doen.		
	<i>Marie tries that to do</i>		
	'Mary tries to do that.'		
	b. Marie <b>mag</b> dat doen.		
	<i>Marie may that do</i>		
	'Mary may do that.'		
	c. Marie <b>hoeft</b> dat niet <b>te</b> doen.		
	<i>Marie needs that not to do</i>		
	'Mary does not need to do that.'		

In section 2.2. I will review properties of Dutch modals that lead me to conclude that Dutch modals are structurally quite different from English modals: they are verbs, as opposed to English modals, which are functional items. One indication of Dutch modals being more similar to regular verbs is that the Dutch modals inflect for tense and aspect: Past tense forms of the six modals are in (4), and their perfect forms are in (5) (note that *zullen* does not occur in the perfect). In English, only *have to* and

*be able to* inflect for tense the way regular verbs do; these modals are for this and other reasons often called *semi-modals*.<sup>10</sup>

- (4) Marie **moest/ mocht/ kon/ zou/ wilde/ hoefde niet** te blijven

*Mary must.PST/may.PST/can.PST/will.PST/want.PST/need.PST not to stay*

'Mary had to/was allowed to/could/would/wanted/doesn't need to stay.'

- (5) Marie heeft dat **gemoeten/gemogen/gekund/gewild/gehoeven**.

*Marie has that must.PF/ may.PF/ can.PF/ need.PF/may.PF/want.PF*

'Marie had to/was able to/needed to/was allowed to/wanted to do that.'

A further property that sets Dutch modals apart from English modals is that Dutch modals can combine with a complement that does not contain an overt verb – they can take what look like an AP (6a), PP (6b), NP (6c), or CP-complement (6d). This is similar to modals in other Germanic languages, such as Afrikaans, German or Norwegian (Barbiers 1995, van Riemsdijk 2002, Eide 2005, van Dooren 2014, 2017), though Eide (2005:27) notes that Dutch has a wider range of possibilities than Norwegian and German because of the availability of an AP-complement (see also van Dooren 2014).

- (6) a. De muur moet **blauw**. AP

*the wall must blue*

'The wall must become blue.'

---

<sup>10</sup> In section 2.3. I will show that being inflected for tense does not make the distinction between lexical and functional modals, and I will maintain the claim that all English modals, including *have to*, are functional.

- b. Jan kan **naar huis**. PP  
*Jan can to house*  
 'John may go home.'
- c. Marie hoeft **geen koekje**. NP  
*Marie needs no cookie*  
 'Marie does not need a cookie.'
- d. Het kan **dat je je even niet lekker voelt**. CP  
*it can that you you a.while not nice feels*  
 'It can happen that you don't feel well for a while.'

The morpho-syntactic properties show that the modals in (1), except for maybe *hoeven* 'need' (2)-(3), behave as a natural class. In this thesis I will include all six since *hoeven* shows the multiplicity of flavors that is central in this thesis. Like modals in other languages, for instance English, Dutch modals can be used to express an epistemic possibility or necessity, i.e., a possibility given what is known (7a), a deontic possibility or necessity, i.e., a permission or an obligation (7b), and a teleological or goal-oriented possibility or necessity (7c), among other flavors. The exceptions here are *mogen* and *willen*, which are restricted to deontic and bouletic<sup>11</sup> flavors, respectively.

---

<sup>11</sup> Barbiers (1995) classifies the habitual interpretation of *willen* 'want' in (i) as a probability (epistemic) use; Aelbrecht (2010) classifies the use in (ii) as epistemic. In van Dooren et al. (2018) we argue that at least *willen* in (ii) behaves like a root modal, and unlike an epistemic modal: One argument is that *willen* in (ii) can combine with a non-verbal complement (*die bank wil nog wel een rondje mee*, 'that couch will last for some more time, lit.. 'that couch wants another round with'), which is limited to non-epistemics (chapter 1 and 4).

(i)	Er <b>wil</b> hier nog wel eens een ongeluk gebeuren <i>there wants here yet well once an accident happen</i> 'Every once in a while an accident occurs here.' (Barbiers 1995:145)	(ii)	Het <b>wil</b> maar niet regenen. <i>it wants prt not rain</i> 'It's still not raining.' (Aelbrecht 2010:22)
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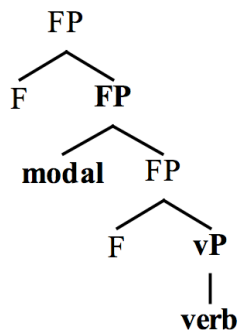
- (7) a. Marie **moet/kan/zal wel/hoeft niet** op haar werk (te) zijn; haar auto staat er niet.  
*Mary must/can/will PRT/needs not on her work to be; her car stands there not*  
 'Mary must/might/will probably/doesn't need to be at work; her car isn't there.'  
 epistemic
- b. Marie **moet/mag/kan/zal/hoeft** haar werk (niet) af (te) maken voor ze weggaat.  
*Mary must/may/can/will/needs her work not off to make before she leaves*  
 'Mary must/may/can/must/ doesn't need to finish her work before she leaves.'  
 deontic
- c. Marie **moet/kan/hoeft niet** naar haar werk (te) gaan om haar collega's weer  
*Mary must/ can/needs not to her work to go for her colleagues again*  
 eens te spreken.  
*sometimes to speak*  
 'Mary must/can/needs to go to work in order to talk to her colleagues again.'  
 teleological

In this brief introduction to Dutch modals we saw that there are morpho-syntactic and semantic properties that Dutch modals share and do not share with modals in other languages such as English: In both languages, modals behave like a natural class, and many of them can be used to express a multitude of modal flavors. In the next section I will argue that there is one crucial property that sets Dutch modals apart from English modals, namely, their lexical status. I will argue that Dutch modals are verbs, as opposed to functional elements.

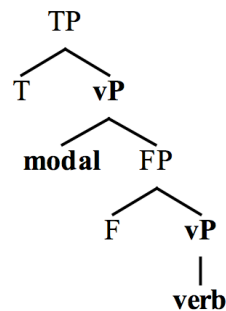
## 2.2. Dutch modals are verbs

The status of Dutch modals is subject to debate, with Haeseryn et al. 1997, IJbema 2001, van Riemsdijk 2002 claiming on the one hand that Dutch modals are functional, and Den Dikken & Hoekstra 1997, Aelbrecht 2010, Broekhuis & Corver 2015 claiming on the other hand that Dutch modals are verbs. What is the difference? If Dutch modals are functional, they are heading a functional projection (FP) above the verb phrase (vP) (8a) and necessarily form a monoclausal structure with the main verb. If Dutch modals are verbs instead, they are heading a verbal projection and project their own functional projections, including tense (8b). Crucially, only a verbal analysis can give rise to a biclausal structure, depending on whether the complement contains tense or not. In this section, I review the arguments provided in the literature and side with the proponents of Dutch modals being *verbs*.

(8) a. functional modals



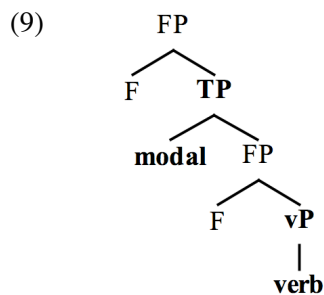
b. modal verbs



### 2.2.1. A non-argument: Inflecting for tense

In section 2.1. I presented initial evidence for why Dutch modals might be considered verbs as opposed to auxiliaries: They inflect for tense and aspect. But what does the

paradigm in (4)-(5) exactly show? It shows us that Dutch modals are not in the Tense Projection above the vP (9), as modals combine with a tense morpheme and as such cannot be instantiations of the same functional head. A standard analysis of English modals like *must* is instead that they are in T, which would explain the absence of temporal inflection (Chomsky 1957, a.o.).



What the paradigm does not show, however, is whether or not Dutch modals head any other kind of functional projection above the vP. Based on two arguments concerning argument structure (section 2.2.1) and tense (section 2.2.2), I will claim that Dutch roots as well as Dutch epistemics are not inside a functional projection but instead, are verbs heading a verb phrase. After that, I will review two arguments made in the literature in favor of the opposite claim, namely, that Dutch modals are auxiliaries. I will argue that for these arguments, alternative explanations are available that are consistent with my claim that Dutch modals are verbs.

### 2.2.2. Argument structure and root modals

For root modals, the diagnostic concerns argument structure. While verbs can<sup>12</sup> introduce arguments other than their complement (Chomsky 1957, Grimshaw 1990), auxiliaries cannot (Pollock 1989, Ouhalla 1991, Seiss 2009, see also Butt 2009). Thus, while the verb *love* introduces two arguments, one in subject position and one in object position (10), the auxiliary *have* (11a) (in contrast to main verb *have* (11b)) cannot introduce such arguments. Instead, in (11a), the arguments are introduced by the main verb, *gotten*.

(10) John loves chocolate.

(11) a. Mary has gotten a car.

b. Mary has a car.

Proponents of the view that Dutch modals are verbal discuss three potential ways in which modals can be shown to have their own argument structure. First, Ter Beek (2008:61) states that if modals select for their subject, they could be assumed to be verbal. While Ross (1969), Jackendoff (1972), Lightfoot (1979), Zubizarreta (1982), Roberts (1985), Brennan (1993) indeed claim that some modals select for animate subjects, Bhatt (1999) and Wurmbrand (1999) demonstrate that looks can be deceiving: Some of the modals that are traditionally considered to select for their subject, like deontic *have to* or *may*, can appear with inanimate (12a) and even expletive subjects (12b), which shows they do not pose restrictions on their subject.

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<sup>12</sup> Note that this argument only goes one way: While *seem* for instance does not introduce any arguments, it is still considered a verb.

The same holds for Dutch modals: Non-epistemic modals (13) can appear with inanimate subjects.<sup>13</sup>

- (12) a. The bin has to go outside tonight.  
b. There may be singing but no dancing on these premises. (Wurmbrand 1999: 601)

- (13) Het afval moet nog naar buiten.

*the trash must still to outside*

'The trash still has to be taken outside.'

A second diagnostic that could show that Dutch modals are verbs is that verbs can select for their complement type, while auxiliaries only take verbal complements. Thus, Aelbrecht (2010: 42) claims that sentences like (14), in which the modal seems to take a PP or a CP-complement, shows that the modal is verbal (cf. Broekhuis & Corver 2015:950). In chapter 3, I will study the phenomenon in (14) in detail and argue that the complement of the modal in (14) is still verbal (cf section 2.1.1. above); from this it follows that this argument does not support the claim that Dutch modals are lexical items.

- (14) a. Jan mag een ijsje.

*Jan may an ice.cream*

'John is allowed to have a popsicle.'

---

<sup>13</sup> Nevertheless, there is some oddity with for instance ability modals and expletive subjects (ia). This may be more of a semantic than a syntactic requirement, whereby the modal needs to be anchored to some event participant, including location (Hacquard 2006), or some kind of semantic EPP (Kratzer 2012).

- (i) a. ??It can rain.  
b. It can rain really hard *in this part of the world*. (Hacquard 2006:125)



b. Het kan dat je je even niet zo lekker voelt.

*it can that you you briefly not so good feels*

'It can be the case that you don't feel so good for a while.'

Barbiers (2005:7) provides a third and final diagnostic for Dutch modals, which supports the claim that at least *deontic* modals are verbal: Dutch deontic modals can introduce an argument denoting the source of the obligation inside a PP (15a). This PP is not licensed by the main verb under the modal, as (15b) shows, and neither can the PP function as an adjunct to any type of sentence expressing an obligation, given that this same PP cannot be licensed inside an imperative (15c).

(15) a. Jan {moet, mag} **van zijn vader** naar huis gaan. (Barbiers 2005:7)

*Jan must may of his father to home go*

'His father forces/allows Jan to go home.'

b. Jan gaat (\*van zijn vader) naar huis.

*Jan goes of his father to home*

'John is going home.'

c. Ga (\*van mij) maar naar huis.

*go (of me) just to home*

'Just go home.'

The argument following from the data in (15) shows that Dutch *deontics* are verbal; I have not been able to find similar arguments for epistemics, or teleologicals. In (16a), for instance, the PP indicates the agent for which the epistemic claim holds,

but this PP can freely be attached to non-modal sentences as well (16b). In (17a), the PP indicates the beneficiary of the goal, but the same PP can be attached to the non-modal (17b).

- (16) a. **Voor Jan** kan de bal nog in de doos zitten. epistemic  
*for Jan can the ball still in the box sit*  
 'For John, the ball can still be in the box.'
- b. **Voor Jan** zit de bal nog in de doos.  
*for Jan sits the ball still in the box*  
 'For John, the ball is still in the box.'
- (17) a. We moeten een hek hebben **voor het huis**. teleological  
*we must a fence have for the house*  
 'We need a fence for the house.'
- b. We hebben een hek **voor het huis**.  
*we have a fence for the house*  
 'We have a fence for the house.'

To summarize the evidence so far, we have seen a strong argument in favor of deontic modals in Dutch being verbal, because they can introduce an argument denoting the source of the obligation. The temporal properties of epistemics discussed in the next section will lead me to conclude that epistemic modals in Dutch are also verbal, and not functional.

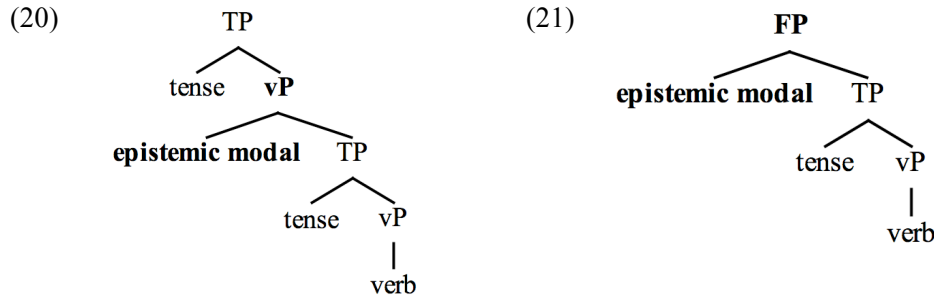
### 2.2.3. Tense and epistemic modals

Tense is a second way to distinguish verbs from functional items. I will show that there are two tenses involved in Dutch epistemic modal sentences: One above the modal and one below. Since there are two tenses present, two TPs, the sentence is biclausal (19) (for the same line of reasoning applied to different items, see Wurmbrand 2001, 2004, Hacquard 2008, a.o.). Therefore, the item under discussion must be a verb. Functional items, on the other hand, form a monoclausal structure with the main verb, which means there is only one TP present.

(19) [TP tense            **[vP verb**            [TP tense            [vP verb]]]

I will use the relation between tense and modality to argue for the claim that Dutch epistemic modals are verbs. Dutch epistemic modals show an exceptional scope pattern with respect to tense: They seem to be able to scope both *over* and *under* tense. This is in contrast to epistemic functional modals, like in English, which can only scope over tense (Cinque 1999, Hacquard 2006, chapter 3; cf. Rullmann & Matthewson for the opposite view). It is also in contrast to root modals cross-linguistically, which can only scope under tense (contra Aelbrecht 2010, section 2.3.4). It follows directly however from a biclausal analysis of Dutch epistemic modal sentences, meaning Dutch epistemics are verbs: First, Dutch modals can scope under the tense of their own clause. Second, Dutch epistemic modals, as epistemic modals in other languages, take a TP-complement (Cinque 1999, Hacquard 2006; cf. the generalization in the introduction), which means they can scope above the tense of

their complement (20). Functional modals, being in a monoclausal structure, only have this second possibility available (21).



How do we determine the scopal interaction between epistemic modals and tense? The question under discussion is what the *evaluation time* or the *temporal perspective* (Condoravdi 2002) of a modal is. When a speaker utters an epistemic claim, at what time is that claim supposed to hold? For present tense epistemics, as in (22), the evaluation time of the epistemic modal is at speech time: The speaker states that it is necessarily the case *at speech time* that Mary is home.

- (22) Marie moet wel thuis zijn (ik zie haar auto nergens). (epistemic)  
*Mary must PRT home be (I see her car nowhere)*  
 'Mary has to be home (I don't see here car anywhere).'

When there is a potential marker for past tense semantics present, such as the past tense morpheme in *moest* in (23), the two options become apparent: In (23), the evaluation time of the epistemic modal could theoretically still be at speech time, while the event under the modal is shifted to the past, giving rise to the interpretation "Given what I know *now*, it is necessarily the case that Mary *was* home" (option i).

Alternatively, the evaluation time of the epistemic modal could have shifted to the past, giving rise to the interpretation "Given what I knew *then*, it *was* necessarily the case that Mary was home" (option ii). Under the first interpretation, the epistemic modal scopes *over* past tense, while under the second interpretation, the epistemic modal scopes *under* past tense.

(23) Mary had to be home. (epistemic)

Option i. 'Given what I *know now*, it *is* necessary that Mary was home.' epi>t

Option ii. 'Given what I *knew then*, it *was* necessary that Mary was home.' t>epi

We will see in chapter 3 that there is a debate about whether sentences like (23) are interpreted as in option (i) or (ii). There is no disagreement about past tense root modals, however, as it is always the modality itself that is backshifted: Root modals scope under tense, as in (24), as the interpretation is one of an obligation that held at some point in the past.

(24) Marie **moest** haar werk afmaken. (deontic)

*Mary must.PST her work off.make*

'Mary had to finish her work.'

In the next two subsections, I will provide data concerning past tense modals in favor of the claim that Dutch epistemics scope *over* and *under* tense. I will conclude that both options are available, and crucially that they are even available at

the same time, which is consistent with a biclausal analysis of epistemic modal sentences, and thus, a verbal analysis of Dutch epistemics.

### 2.2.3.1. *Epistemic modals scope over tense*

In Dutch, two different surface forms with an epistemic modal and a past tense marker can lead to an interpretation of a *current* likelihood of a *past* event (Ter Beek 2008): In (25a), the modal itself is in the simple past, and in (25b), there is an auxiliary in the complement of the modal. Both of these types of sentences thus provide evidence in favor of the claim that Dutch epistemic modals can take scope over tense.<sup>14</sup>

- (25) a. Jan moest/ kon thuis zijn. (epistemic)  
*Jan must.PST can.PST home be*  
 'Jan had to be home.'
- b. Jan moet/kan thuis zijn geweest. (epistemic)  
*Jan must can home be been*  
 'Jan has to/could have been home.'

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<sup>14</sup> In chapter 5, I will discuss epistemic modals in the perfect (i), for which the only and unexpected interpretation is one in which the epistemic modal scopes over the perfect (Boogaart 2007). Since the perfect is a combination of tense and aspect, I will not include it in the current discussion.

(i) Jan heeft thuis moeten/ kunnen zijn. (epistemic)  
*Jan has home must.INF can.INF be*  
 'Jan has had to/could have been home.'

### 2.2.3.1.1. Modals in the simple past

First, I will briefly discuss the modal in simple past, but note that the possible interpretations of this form are the topic of the next chapter. A sentence like (26) in the given context indicates that there is a *current* likelihood of a past event.<sup>15</sup>

(26) (Context: A detective is looking at a call history)

De verdachte moest gisteravond dus wel bereik hebben.

*the suspect must.PST last.night thus PRT cell.service have*

'It is necessary that the suspect had cell service last night.'<sup>16</sup>

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<sup>15</sup> While Barbiers (1995:202-203) claims that modals do not take a TP-complement (do not have tense in their complement), he mentions example (i) in footnote (45), for which he gives the scopal interpretation possibility > past. To me, this seems to be another instance of an interpretation of a *current* possibility.

(i) Er kon een ongeluk gebeurd zijn.  
*there can.PST an accident happened be*

'There may have been an accident.' (Barbiers 1995:202, my translation)

<sup>16</sup> Natural occurring examples that seem to give rise to the same interpretation are in (i)-(iii).

(i) Ik heb het echt bijna als een gewone menstruatie ervaren maar moest dus een  
*I have it really almost as a normal period experienced but must.PST thus a*  
*implantation.bleeding be been*  
innestelingsbloeding zijn geweest! <https://www.ovulatie-berekenen.com/de-innesteling-en-innestelingsbloeding>

'I've experienced it as almost a regular period but it thus had to be an implantation bleeding.'

(ii) Anderzijds het moest wel een flinke knal zijn geweest, meestal breekt zo iets  
*on.the.other.hand it must.PST PRT a loud bang be been usually breaks such something*  
nog niet wanneer een gitaar gewoon omvalt.  
*still not when a guitar normally falls over*

'On the other hand, it must have been a loud bang, something like that normally does not break when a guitar falls over.' <http://www.gitaarnet.nl/archive/index.php/t-125225.html>

(iii) Wat bijzonder, dat moest wel even een shock zijn geweest opeens twee kindjes, maar  
*how special, that must.PST PRT PRT a shock be been instantly two children.DIM but*  
wel echt onwijs leuk!

*PRT really super nice*

'How special, that must have been a shock all of a sudden two babies, but definitely super nice!' <https://www.twinkelbella.nl/zwangerschapsupdate-marieke-zwanger-van-een-tweeling/>

#### 2.2.3.1.2. Modals with *hebben* 'have' in their complement

A second sentence type in which epistemics scope over tense is when the modal combines with *hebben* 'have' in its complement. Ter Beek (2008) claims that *hebben* 'have' in infinitival complements can semantically be an 'absolute' or a 'relative' tense. I will argue that this is a distinction between tense (for absolute tense) and aspect (for relative tense). Crucially, when *hebben* in the complement of the modal expresses tense, only an epistemic modal flavor is available. If true, this provides further evidence that Dutch epistemics, but not Dutch roots, take a tensed complement. But how is it possible to have tense in an infinitival complement like (27)? And if there is indeed tense, how does one diagnose it?<sup>17</sup>

- (27) Jan moet hebben geslapen. root, epistemic  
*Jan must have slept*  
'Jan must have slept.'

Since modals take infinitival complements, and infinitives are commonly assumed not to be tensed (though see Stowell 1981, 1983, Wurmbrand 2001, Condoravdi 2002, for seminal work on tense in infinitives) the starting hypothesis is that *hebben* in (27) is not a tense marker (28a). Instead, it is an aspect marker (28b). What is the difference? While aspect relates the running time of the VP-event to a reference time, tense relates the time of the VP-event to speech time (cf. chapter 1; in

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<sup>17</sup> Ter Beek (2010) discusses a second diagnostic that according to her, supports the claim that epistemics but not roots scope over tense. This diagnostic concerns the availability of temporal adverbs. In contrast to English, however, temporal adverbs like *gisteren* 'tomorrow' are compatible with both a simple past and a perfect and as such does not necessarily distinguish between the categories tense and aspect.



(28), tense would express whether the event of sleeping precedes/follows the time of utterance).

- (28) a. [Jan moet [TP hebben [vP geslapen ]]]  
b. [Jan moet [AspP hebben [vP geslapen ]]]

The notion of reference time is easiest explained by means of an example: In (29), the cleaning event is past with respect to the reference time 'when his parents return', but not necessarily with respect to the utterance time (Ter Beek 2010:78). Sentences like these show that Dutch *hebben* in the complement of a modal can be an aspect marker as it can express a relation between the event time and a reference time.

- (29) Jan moet het huis opgeruimd hebben als zijn ouders terugkomen. Ter Beek 2010:78  
*Jan must the house cleaned have when his parents return*  
'Jan must have cleaned the house by the time that his parents come back.'

Can *hebben* also express a relation between the speech time and the event time? For English infinitival complements, the status of the auxiliary *have* has been discussed in depth, with Hoffmann (1966) providing a number of diagnostics showing that the auxiliary *have* can semantically be a tense marker since it can backshift the event time with respect to the utterance time (cf. Stowell 1981, 1983, 2007). For Dutch, Ter Beek (2008:93) (see also Zwart 2014) provides a diagnostic based on one of the well-known differences between a Dutch simple past and a perfect: only a Dutch simple past can have a simultaneous reading with a past reference time

(Janssen 1994, Boogaart 1999). In (30), the addition of the past tense adverbial phrase *toen Marie binnenkwam* 'when Marie entered' sets up a past reference time that is simultaneous with the main clause: The event of Mary entering occurred at the same time as the event of John sleeping, which both occurred before utterance time. In Dutch, this combination with the simple past is acceptable (30), but not with the perfect (31).

(30) Jan deed de afwas **toen Marie binnenkwam**.

*Jan did the dishes when Marie entered*

'Jan was doing the dishes when Marie came in.'

(31) \*Jan heeft de afwas gedaan **toen Marie binnenkwam**.

*Jan has the dishes done when Marie entered*

Ter Beek (2008:92) uses this diagnostic for locating a semantic past tense in an infinitival clause with the auxiliary *hebben* 'have': If there is a semantic past tense in the infinitival clause, it should be possible to add a temporal phrase like *when Mary entered* and have an interpretation in which the event time of the infinitival clause is simultaneous to the past temporal phrase. Ter Beek calls this the 'Past Tense Replacement test' because the auxiliary behaves semantically like a past tense.

By means of this diagnostic, we can test whether the auxiliary *hebben* 'have' under a modal can indeed be an instantiation of a past tense. Ter Beek (2008:109) shows that epistemic modals, but not deontic modals, license a simultaneous reading of the event time of the complement and a past tense adverbial phrase (32). This

means that Dutch epistemic modals take a tensed complement (33), while deontic modals do not.<sup>18</sup>

(32) Jan moet de afwas hebben gedaan **toen Marie binnenkwam**. Ter Beek (2008:109)

*Jan must the dishes have done when Marie entered*

i. \* 'Jan has the obligation to have been washing the dishes when Marie came in.'

(deontic)

ii. 'Jan must have been washing the dishes when Marie came in.' (epistemic)

(33) a. [TP [vP Jan moet [TP **hebben** [vP de afwas gedaan ]]] (epistemic)

b. \*[TP [vP Jan moet [TP **hebben** [vP de afwas gedaan ]]] (deontic)

Note that the unavailability of a deontic modal flavor in (32) is not due to a general incompatibility with the embedded auxiliary *hebben* 'have'. The contrast between (29) and (32) shows that deontic modals can embed the auxiliary *hebben* 'have', but that this is not encoding tense, but rather, aspect.<sup>19</sup>

A final note concerns the different flavors Ter Beek (2008) distinguishes: following Barbiers's (1995) classification, Ter Beek discusses two more modal flavors: The first one is a dispositional flavor, which 'expresses a force internal to the subject' (Ter Beek 2008:108), which could be a desire or an urge. The second one is a

<sup>18</sup> Note that this conclusion differs from Condoravdi's conclusion for English modals as in (ia): She claims that the temporal auxiliary under modals like *must* behave like a perfect as it can combine with adverbs such as *already* (ib-c), which are licensed by the perfect (ic) but not by the simple past (ib). This test does not carry over to Dutch, as the same adverbs are acceptable with a Dutch simple past (ii).

(i) a. He must have already returned. (ii) Hij kwam (alweer) terug.  
b. He (\*?already) returned. *he came already back*  
c. He has already returned. 'He already returned.'

<sup>19</sup> In chapter 1, this is the reason why I claim roots take a predicate of times, rather than a predicate of events

non-directed deontic flavor (an 'ought-to-be deontic', Feldman 1986), which expresses an obligation that is not imposed on the subject of the sentence. Ter Beek (2008) argues that the dispositional use patterns with deontics, while non-directed deontic use patterns with epistemics (34). These further distinctions will be discussed in chapter 4; for now it is important to note that while the judgment for dispositional modals is crisp (34i), the judgment for the non-directed deontic not always is (34ii). Ter Beek's judgment for the Past Tense Replacement test is that it is 'marginal' (Ter Beek 2008:109): The sentence in (34ii), when interpreted as an overall goal or obligation is marked with a question mark (?).

(34) Jan moet de afwas hebben gedaan **toen Marie binnenkwam**.

*Jan must the dishes have done when Marie entered*

i. \*'Jan has the urge to have been washing the dishes when Marie came in.'

(dispositional)

ii. ? 'It is required that John was washing the dishes when Marie came in (if he wants to be hired as her housekeeper).'

(non-directed deontic)

#### 2.2.3.1.3. Intermediate summary

The previous two subsections make a strong case for Dutch epistemics to be able to scope *over* tense. What is more, whether the modal is in the simple past or takes a complement with an auxiliary, we find a difference between epistemics and roots: Root modals do not take a tensed complement and can thus not scope over tense, while epistemics can scope over tense, which means it takes a tensed complement.

Finally, we find an unexpected spell-out for one of the two cases: In the case of a modal in the simple past, the tense is *on* the modal, but the interpretation is one of a current likelihood of a past event – it is the event in the complement that has shifted to the past, instead of the epistemic modal. In this respect, epistemic modals, which I claim are verbs, are still different from other verbs expressing an epistemic claim: In contrast to sentence (35a), (35b) with the epistemic verb *lijken* 'seem' does not have an interpretation of a current likelihood of a past event. The paradigm in (35) will be experimentally tested in chapter 3, the results of which indeed indicate a difference between epistemic modals and epistemic verbs like *lijken* 'seem'.

(35) (Context: A detective is looking at a call history)

a. De verdachte moest gisteravond dus wel bereik hebben.

*the suspect must.PST last.night thus PRT cell.service have*

‘It is necessary that the suspect had cell service last night.’

b. De verdachte leek gisteravond dus wel bereik te hebben.

*the suspect seem.PST last.night thus PRT cell.service have*

‘It was likely that the suspect had cell service last night.’

# ‘It is likely that the suspect had cell service last night.’

In the next section we find equally strong evidence for a second scope relation found in Dutch epistemics: Dutch epistemics can also scope under past tense. As stated in the introduction of this section, the possibility of epistemic modals to scope both over and under tense, even in the same sentence, supports a biclausal analysis of Dutch epistemic modal sentences, and thus, the claim that Dutch modals are verbal.

### 2.2.3.2. Epistemic modals scope under tense

Aelbrecht (2010) claims that Dutch epistemics scope under tense, based on sentences like (36). The first part of this sentence can be interpreted as 'According to what I knew yesterday, it *was* highly likely that he had been in Portugal on his birthday', giving rise to an interpretation of a *past* likelihood. Support for this interpretation comes from the second part of this sentence, in which the speaker contrasts the first epistemic claim with an epistemic claim that holds at speech time: '... but the new evidence indicates that that was a wrong conclusion.'

- (36) Gisteren **moest** hij nog in Portugal geweest zijn op zijn verjaardag, maar het  
*yesterday must.PST he still in Portugal been be on his birthday but the*  
nieuwe bewijsmateriaal toont aan dat dat een foute conclusie was.  
*new evidence shows on that that a wrong conclusion was*  
'Yesterday it was still highly likely that he had been in Portugal on his birthday, but  
the new evidence indicates that that conclusion was wrong.' (Aelbrecht 2010:34,  
my translation)

Note that similar examples with *kunnen* 'can' (37) and *hoeven* 'need' (38) are acceptable as well. Again, the sentence expresses a past likelihood that is contrasted with speech time. This shows that the scopal relation is available for all Dutch epistemics.

- (37) Gisteren **kon** hij nog in Portugal geweest zijn op zijn verjaardag, maar het  
*yesterday can.PST he still in Portugal been be on his birthday but the*

nieuwe bewijsmateriaal toont aan dat dat onmogelijk was.

*new evidence shows on that that impossible was*

‘Yesterday it was still possible that he had been in Portugal on his birthday, but the new evidence indicates that that was impossible.’

- (38) Gisteren **hoefde** hij nog niet in Portugal geweest zijn op zijn verjaardag, maar het

*yesterday need.PST he still not in Portugal been be on his birthday but the*

nieuwe bewijsmateriaal toont aan dat dat zeker weten het geval was.

*new evidence shows on that that surely known the case was*

‘Yesterday it was still not necessarily the case that he had been in Portugal on his birthday, but the new evidence indicates that that surely was the case.’

### 2.2.3.3. Combining the tense data

From the two datasets I conclude that there is evidence for two scopal orders between tense and epistemic modals in Dutch, with epistemic modals being able to scope both *above* and *below* past tense. An immediate prediction from my analysis that Dutch epistemic modal sentences are biclausal, is that for Dutch epistemic modals, there will be sentences in which the modal scopes both below and above tense: Since Dutch epistemic modal sentences are biclausal, there are two TPs<sup>20</sup>, which can both be filled by different tense marker. This is indeed what we find. The past tense above the epistemic modal can be diagnosed by sentences provided by Aelbrecht (2010). The past tense below the epistemic modal can be diagnosed by Ter Beek's Past Tense Replacement Test. As a reminder, the Past Tense Replacement Test diagnoses past tense under the modal by means of having a simultaneous reading with a past tense

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<sup>20</sup> For the data in section 2.2.2.2. above, an alternative analysis is that the auxiliary *zijn* is an aspect, and not a tense.

adverbial phrase. The result is in (39): Here, the epistemic modal itself is backshifted with respect to utterance time, while the complement is also backshifted and interpreted as simultaneous with the past tense adverbial phrase. The sentence in (39) contains two TPs, which is possible because Dutch epistemic modal sentences are biclausal and the Dutch epistemic modal is verbal.

(39) Huh? Waarom vertel je me dat Marie in Parijs was toen de pandemie losbarstte?

*Huh? Why tell you me that Marie in Paris was when the pandemic erupted*

'Huh? Why are you telling me that Marie was in Paris when the pandemic erupted?'

**Gisteren moest Marie nog in Portugal geweest zijn toen de pandemie**

*Yesterday must.PST Mary still in Portugal been be when the pandemic*

**losbarstte!**

*erupted*

'Yesterday, according to you, Mary was still supposed to have been in Portugal when the pandemic erupted!'

#### 2.2.3.4. A note on future tense

The previous datasets concern the interaction between modals and past tense. How about future tense? Concerning the interaction between modals and future tense, contradicting claims have been made, which moreover contradict the claim I am making in this chapter: Barbiers (1995:202) claims that Dutch modals do not have tense in their complement, on any flavor, based on an argument involving the auxiliary *zullen* 'will'. Aelbrecht (2010:33) claims on the other hand that Dutch modals have tense in their complement on all flavors, based on an argument involving



future temporal adverbs. Both of these claims contrast with my claim that epistemics but not roots take a tensed complement (following Ter Beek 2008).

In this section, I will argue that arguments based on future markers are less reliable than arguments based on past markers, given that future markers can be instantiations of (a) tense, (b) prospective aspect, and (c) modality (Bochnak 2018, van Dooren et al. 2019, Ter Beek 2008). Both *zullen* and future temporal adverbs do not unambiguously diagnose the presence of tense, which is why I rely on the arguments made in the sections concerning past tense. In the previous sections, I argued that past tense unambiguously distinguishes epistemics from roots, with epistemics taking a tensed complement, and roots taking an untensed complement.

#### 2.2.3.4.1. Future temporal adverbs

Aelbrecht (2010) claims that both Dutch epistemics and Dutch roots take a TP-complement, in contrast to the claim defended here, which is that only epistemics take a TP-complement. What is her support for the claim that roots take a TP-complement? Aelbrecht claims that sentences with root modal verbs have two TPs, which leads her to the same conclusion I made for epistemic modals above. In sentence (40), the time of the obligation is at a time past of speech time, while the time of the event under the modal is at a later time. As with epistemic modals (section 2.2.5), the root modal can scope both over and under tense leading to a biclausal sentence in which the modal takes a TP-complement (41).

(40) a. **Vorige week** moest ik **morgen** komen helpen, en nu is het weer

*last week must.PST I tomorrow come help and now is it again*

verplaatst naar overmorgen.

*moved to the.day.after.tomorrow*

‘Last week I had to come and help tomorrow, and now they moved it to the day after tomorrow.’

b. **Vorige vrijdag** kon hij **de dag erna** komen schilderen, maar er is weer

*last Friday can.PST he the day there.after come paint but there is again*

iets tussengekomen.

*something intervened*

‘Last Friday he could come paint the day after, but again something intervened.’

c. Hoewel hij drie maanden geleden nog niet in top-conditie was, heeft hij de

*although he three months ago still not in top-condition was has he the*

voorbije weken stevig getraind en ik ben er zeker van: **na zijn volgende**

*past weeks considerably worked.out and I am there sure of after his next*

**training morgen** kan hij **in mei** de 20 kilometer van Brussel lopen.

*training tomorrow can he in May the 20 kilometer of Brussels run*

‘Although he wasn’t in top condition yet three months ago, he’s been training considerably and I’m sure that after his next training tomorrow he’ll be able to run the 20 kilometers of Brussels in May.’ (Aelbrecht 2010:33-34)

(41) [TP [vP root modal [TP [vP verb ]]] (Aelbrecht 2010)

The reason to doubt that the sentences in (40) support the analysis in (41) is that the temporal adverbs in the complements (*morgen* ‘tomorrow’, *de dag erna* ‘the day after’, *na zijn volgende training morgen* ‘after his next training tomorrow’) all shift the event time of the complement to the *future*. Ter Beek (2008:109) shows that future adverbs are not a reliable diagnostic for a TP-layer. In what follows, I will lay

out Ter Beek's line of reasoning and follow her conclusion that while root modals may take a complement that is slightly bigger than a vP, it does not follow that it includes a tense layer.

The core of Ter Beek's argument is as follows: She argues that the availability of future-oriented adverbs is an unreliable diagnostic as these adverbs are known to be able to combine with clauses that do not allow any other kind of tense (Martin 2001, Wurmbrand 2007). Instead of tense, future temporal adverbs are therefore analyzed as modals indicating 'posteriority' (42) (Abusch 1985, see also Thomason 1970, Condoravdi 2001, Wurmbrand 2007, Ter Beek 2008), which are in a modal projection closer to the vP. Alternatively, in my proposal, roots take Aspectual Phrases as their complement. This also leaves room for a potential future shifter, prospective aspect, which has an aspectual analysis. As such, the complement of both root and epistemic modals can contain a modal layer denoting posteriority, or an aspectual layer denoting prospective aspect, but only the complement of epistemics can contain a TP layer, for arguments laid out in section 2.2.3. above.

(42) [vP modal [ModP tomorrow [vP verb ]]]

What support is there for future-oriented adverbs to combine with clauses that do not allow any other kind of tense modification? Martin (2001) and Wurmbrand (2007) discuss so-called 'tenseless infinitives', which are infinitives embedded under verbs such as *decide*. Infinitival complements of verbs like *decide* can be modified either by a future temporal adverb (43) or by a past temporal adverb (44a), but in both

cases, the temporal relation between the main clause and the embedded clause is the same: the event in the embedded clause needs to *follow* the event denoted in the main clause. A possible interpretation for (44a) is therefore that the party has happened before speech time, which contrasts with a finite complement of the same verb (44b), in which case the event needs to happen after speech time.

(43) Leo decided to go to the party **tomorrow**.

(44) a. Leo decided a week ago to go to the party (**yesterday**). (Wurmbrand 2007:409)

b. Leo decided a week ago that he will go to the party (**\*yesterday**).

The sentence in (44a) shows that the infinitival complement inherently encodes posteriority. Wurmbrand (2007:410) therefore proposes that the complements of verbs like *decide* do not contain tense but instead, a modal element *woll* that encodes posteriority (45) (Abusch 1985, see also Thomason 1970, Condoravdi 2001, *Mood* for Ter Beek 2008).

(45) [vP decide [ModP *woll* tomorrow [vP verb ]]]

In sum, whether or not infinitival complements can take a future temporal adverb is thus not a diagnostic for a TP-layer. Note that the temporal adverbs in the case of an epistemic modal in section 2.2.5. all diagnose an actual past tense.

#### 2.2.3.4.2. The auxiliary *zullen*

Barbiers (1995:201) presents two arguments in favor of the claim that neither epistemics, nor roots take a TP-complement. This claim contradicts my claim that epistemics, but not roots take a TP-complement. What are his arguments? First, he credits Cremers (1983) for the argument that modal sentences cannot contain two temporal adverbs, irrespective of the flavor that the modal has. This could show that the complement is not the size of a TP. The sentences in 2.2.2.2. and 2.2.2.3. above show however that sentences with both epistemic and root modals can contain two temporal adverbs. The second argument, also discussed by Ter Beek (2008), concerns the auxiliary *zullen* 'will'. *Zullen* 'will' cannot be embedded under any modal, irrespective of the modal flavor (46).

(46) a. \*Jan moet/ kan/mag/wil zullen werken

*John must/can/may/wants will work*

b. \*Jan hoeft niet te zullen werken.<sup>21</sup>

*John needs not to will work*

This is potentially a strong argument, if *zullen* is indeed a tense marker located in a TP. The semantics of *zullen* is however still under debate, with Broekhuis & Verkuyl (2013) claiming that *zullen* is a modal instead of a tense marker. This discussion resonates with cross-linguistic observations concerning future markers: They have been argued to be tense markers (Kissine 2008 on English *will*), but also

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<sup>21</sup> Though I find (i) acceptable both with and without *zullen* 'will'.

(i) Het hoeft niet altijd zo te (zullen) blijven.  
*it needs not always so to will stay*  
'It doesn't need to stay like this forever.'

aspect markers (Copley 2009 on English *be going to*, Matthewson 2013 on Gitksan *dim*) or modals (Palmer 1987, Klecha 2014 on English *will*, van Dooren et al. 2019 on Dutch *willen*, Mandarin *yao* and Brazilian-Portuguese *querer*). For *zullen*, Broekhuis & Verkuyl (2013) claim that it is an epistemic modal, and the future semantics is encoded in the present tense on the modal, which is semantically non-past.

In sum, while Barbiers's argument concerning *zullen* is a potential problem for my analysis that epistemic modals take a TP-complement<sup>22</sup> (though see Cremers 1983, IJbema 2001 and Ter Beek 2008 for further complications concerning the verbs under which *zullen* can and cannot be embedded), I will put this argument aside for now as an alternative analysis of *zullen* is available, in which *zullen* is not a tense. Future research on *zullen* will have to determine whether I need to revise my analysis.

#### 2.2.4. The other side of the debate

So far, I have presented two arguments for Dutch modals being verbs and not functional items. Deontic modals are able to introduce an argument encoding the source of the obligation, which argues in favor of a verbal analysis as verbs, but not auxiliaries can introduce arguments outside of their complement. While there was no evidence for epistemic modals to introduce arguments as well, the reason why they are considered to be verbs is that they occur in biclausal sentences, which is supported by the fact that they epistemic modals can scope both over and under past

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<sup>22</sup> A further argument that tense might not be the cause for the infelicity in (46) could be that the auxiliary *gaan* 'go' can be embedded under epistemic modals (i); though here as well it first needs to be determined whether *gaan* is a tense marker.

(i) Het moet dus wel gaan stormen.  
*it must thus PRT go storm*  
 'It thus has to start storming.'

tense. The semantics of future markers in Dutch need to be studied further in order to determine whether they count in favor or against the claims being made here.

The difference between verbs and auxiliaries is not always easy to make; it is thus not surprising that there has been a debate in the literature about the structural position of Dutch modals. In the next two sections I will present two arguments made in the literature in favor of the opposite claim, namely, that Dutch modals are auxiliaries. I will argue that there are alternative explanations for the data, which is consistent with my claim that Dutch modals are verbs.

#### 2.2.5. Phonetic reduction

Van Koppen (1999) claims that auxiliaries are phonetically reduced in inversion contexts, while verbs are not. IJbema (2001) uses the fact that Dutch modals are phonetically reduced in these contexts (67) to support her claim that the modals are auxiliaries.

- (67) a. Moeten we komen? → moe-we *must-we*  
*must we come*  
'should we come?'
- b. Morgen mag je langskomen. → ma-je *may-you*  
*tomorrow may you pass-by*  
'you can pass by tomorrow'
- c. Morgen kan ze komen kijken. → ka-ze *can-she*  
*tomorrow can she come look*  
'she can come and take a look tomorrow'
- d. Morgen willen we de papieren hebben. → wi-we *want-we*

*tomorrow want we the papers have*

‘we want to have the papers by tomorrow’

e. *Zal ik dat doen?*

→ *za-k will-I*

*will I that do*

‘shall I do that?’

(Van Koppen 1999 in IJbema 2001:44)

An alternative explanation for this fact, however, is frequency of occurrence: Modals are highly frequent in Dutch (for an estimate, 6.2% of adult speech in the Groningen corpus (which contains spoken interactions between children and their caretakers, Wijnen & Verrips 1998) contains one of the six modals under discussion (16,441/263,111 total utterances), van Dooren et al. 2019), and in general, highly frequent items are susceptible to phonological reductions. This thus might explain the data in (76). Since an alternative explanation is available, I will set this argument aside until the two competing hypotheses (verb vs. auxiliary or frequency) have been tested.

#### 2.2.6. Restructuring effects

Traditional Dutch grammars (Haeseryn et al. 1997) use the property of verbal clustering and the *Infinitivus Pro Participio* (IPP) effect as defining features for being auxiliaries. More recent studies (Ter Beek 2008, Broekhuis & Corver 2015) oppose this view and instead claim that verbal clustering and the IPP-effect also target verbs. I will follow their conclusion. Since the literature on this topic is vast and keeps growing, I will only be able to summarize and discuss some key findings.



To start out, (68) and (69) shows the two effects central in this debate. The effect of verb clustering is shown in (68): (68a) shows that Dutch embedded sentences have Object-Verb (OV) word order. When an auxiliary is added to an embedded sentence, such as the aspectual auxiliary *zitten* 'sit' in, the object selected by the verb *lezen* 'read' has to be separated from the verb (68b). This word order phenomenon is analyzed as a 'clustering' of the auxiliary and the main verb.

- (68) a. Marie zegt dat Jan het boek leest.

*Mary says that Jan the book reads*

'Mary says that John is reading the book.'

- b. Marie zegt dat Jan {het boek} zit {\*het boek} te lezen.

verb clustering

*Mary says that Jan the book sits the book to read*

'Mary says that John is reading the book.'

In (69) the IPP-effect is shown. The perfect marker in Dutch normally selects for the participle form of a verb (69a). If an auxiliary is added to this sentence, as in (69b), the auxiliary however does not appear as a participle but as an infinitive.

- (69) a. Marie zegt dat Jan het boek heeft {gelezen, \*lezen}.

*Mary says that Jan the book has read.PTC read.INF*

'Mary says that John has read the book.'

- b. Marie zegt dat Jan het boek heeft {zitten, \*gezeten} te lezen.

IPP effect

*Mary says that Jan the book has sit.INF sit.PTC to read*

'Mary says that John has been reading the book.'

Modals are subject to both verb clustering and the IPP-effect (70). Since they pattern similar to aspectual auxiliaries in this respect, does this mean they *are* auxiliaries?

- (70) a. Marie zegt dat Jan {het boek} moet {\*het boek} lezen. verb clustering  
*Mary says that Jan the book must the book read*  
 'Mary says that John has to read the book.'
- b. Marie zegt dat Jan het boek heeft {moeten, \*gemoeten} lezen. IPP effect  
*Mary says that Jan the book has must.INF must.PTC read*  
 'Mary says that John has to have read the book.'

Both 'yes' and 'no' answers have been given in the literature, depending on the proposed analysis of these and other *restructuring* or *transparency* effects.<sup>23</sup> The terms restructuring and transparency cover a wide range of effects in a wide range of languages caused essentially by multiple clauses functioning as one. Cinque (2004) makes a basic distinction between items that restructure and items that do not, and claims that the first kind consists only of functional items (71) (in my terms, auxiliaries; items heading a functional head above the vP). Rizzi (1978) presents an analysis in which all items are identical in kind, and that the restructuring effects are accomplished derivationally. Following Rizzi, items that show restructuring effects thus do not need to have a functional status (72). Finally, by including different languages such as German, Wurmbrand (1999) argues in favor of 'graded'

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<sup>23</sup> This paragraph is based on Ter Beek's introduction (Ter Beek 2008:15-20).

restructuring: different items take different sizes of complements and because of this show different restructuring effects (73). In this analysis nothing prevents main verbs from showing restructuring effects either; what matters is what type of complement the items take. In sum, only when one follows Cinque's analysis for restructuring, would the presence of restructuring effects with modals count as a potential argument for them being auxiliaries.

(71) Cinque:

- a. [Functional Projection      [XP]] → can behave as one clause
- b. [Lexical Projection      [XP]] → cannot behave as one clause

(72) Rizzi

- [XP [XP]] → can behave as one clause

(73) Wurmbrand

- a. [XP [CP]] → cannot behave as one clause
- b. [XP [vP]] → can behave as one clause

As with the argument of phonological reduction above, there are alternative analyses of verb clustering and the IPP-effect that do not entail that items that cause this effect are auxiliaries (see also Ter Beek 2008<sup>24</sup>). I will therefore instead rely on the conclusive arguments from section 2.2.1 and 2.2.2. above, which support the claim that Dutch modals are verbs.

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<sup>24</sup> Ter Beek (2008) follows Wurmbrand's analysis but furthermore argues that in contrast to German, the size of the complement in Dutch does not categorically match with the presence of restructuring effects: The complements that restructure instead show a range of variation in size (VP, TP, MoodP, AspP, see also section 2.2.).

A final note: An alternative proposal could be that there is massive ambiguity present: A modal is a verb heading a verb phrase when it shows hallmarks of being a verb, which in this chapter has been argued is the ability to introduce an argument (74a). When it shows restructuring effects, however, it is an auxiliary heading a functional projection above the vP (74b).

- (74) a. Jan moet **van zijn vader** naar huis gaan. → [vP must ... [vP go]]  
*Jan must of his father to home go*  
 'His father forces/allows Jan to go home.'
- b. Marie zegt dat Jan het boek **moet** lezen. → [FP must ... [vP read]]  
*Mary says that Jan the book must read*  
 'Mary says that John is reading the book.'

Broekhuis & Corver (2015:634) show that this cannot be true for items like *zien* 'see' and *laten* 'let' as they can at the same time introduce a new argument and show restructuring effects: *zien* 'see' and *laten* 'let' can both introduce an additional argument (*Marie*) while showing the IPP-effect (75a). (75b) shows that this argument cannot be introduced by the embedded verb itself. The same holds for the Dutch modals, as (76) contains both an additional argument introduced by the modal, and undergoes verb clustering demonstrated by the separation of the object *het boek* 'the book' from the cluster.

- (75) a. Jan heeft **Marie** de auto zien/laten starten. IPP-effect  
*Jan has Marie the car see.INF/let.INF start*

'John heard/let Mary start the car.'

b. \*Jan start **Marie** de auto.

*Jan starts Mary the car*

(76) Marie zegt dat Jan **van zijn vader** {het boek} moet {\*het boek} lezen. verbclustering

*Mary says that Jan from his father the book must the book read*

'Mary says that John has to read the book from his father.'

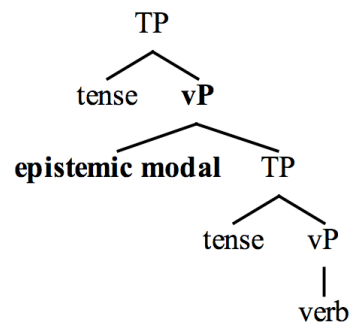
Following Ter Beek's (2008) and Broekhuis & Corver's (2015) analysis, we can conclude that the presence of restructuring effects for Dutch modals does not automatically count as an argument in favor of being an auxiliary.

### 2.3. Implications of a verbal analysis of modals

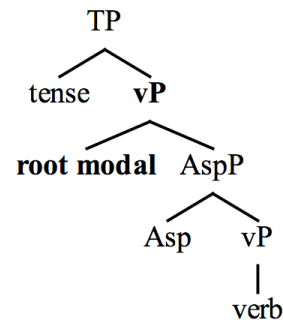
In this chapter I argued for a verbal analysis of Dutch modals. The structures, repeated from the introduction, are in (77).

(77) modal verbs (Dutch)

a.



b.



Dutch epistemic and root modals are structurally at the same height: They are both verbs heading a vP. This is the first building block of my proposal. The second building block is that we find a syntactic restriction on modal flavor: Epistemic modals can scope over tense, while root modals cannot (Cinque 1999, Hacquard 2006). Combined, these building blocks lead to my main claim: Modals combine with different sizes of complements depending on their modal flavor (see also Ramchand 2014, chapter 1). Epistemics combine with a Tense Phrase, while root modals combine with a smaller phrase that does not contain tense. Previous proposals trying to explain the difference between epistemics and roots appeal to a difference in structural height (Cinque 1999, Hacquard 2006). These proposals are unavailable for Dutch modals as both are verbs heading a vP and are thus at the same structural height. A proposal based on complement size instead applies to modal verbs and functional modals alike.

## Chapter 3: Tensed epistemics in Dutch and beyond

In chapter 1 and 2 I presented my analysis of the structure of Dutch modal sentences. I argued that Dutch modals are different from modals in languages such as English and French, in that they are *verbs* as opposed to *functional items*. At the same time, I argued that Dutch modals are like modals in other languages in that their flavor is restricted by the type of complement they take:

**Generalization:** Modals combine with different sizes of complements depending on their modal flavor, namely:

- *epistemics* combine with a Tense Phrase; (Cinque 1999, Hacquard 2006)
- *roots* combine with smaller phrases: (Rubinstein 2019)
  - *deontics* combine with a Verbal Phrase
  - *teleologicals* can combine with even smaller phrases

In this chapter, I will provide data concerning the interaction between epistemic modals and tense, which support both the claim that Dutch and English modals differ in lexical status (verbs vs. functional elements), and with the generalization that epistemics take TP complements, across both types of languages.

There is a longstanding debate in the literature about whether epistemics in various languages scope above tense (Groenendijk & Stokhof 1975, Iatridou 1990, Stowell 2004, Condoravdi 2002, Hacquard 2006, 2010, a.o.), or below tense (von Stechow & Gillies 2007, Rullmann & Matthewson 2018). Note that this debate

presupposes that epistemic modal statements involve a single tense projection. Here, I will show that this question is particularly interesting in Dutch, as Dutch epistemics seem to both scope above *and* below past tense. I will argue that this is because Dutch epistemic modal sentences are biclausal: Dutch modals are *verbs*, which means that they host their own verbal projection, and a past tense marker can thus be interpreted above the modal, within its own clause (1a). However, Dutch epistemic modals take TP complements, following the cross-linguistic generalization above, and a past tense marker can thus also be interpreted in the modal's complement. As a result, the modal can also scope above tense, namely, the tense in their complement (1b).

- (1)    a. [TP **past tense**            [vP modal            [TP                    [vP verb ]]]]  
           b. [TP                            [vP modal            [TP **past tense** [vP verb ]]]]

In what follows, I will first summarize the debate so far, which shows that there is disagreement about the basic facts for various languages. I will therefore present an experiment on English, French and Dutch. While the results of this experiment are not entirely clear cut, they do not support the claim that epistemic modals always scope *under* tense, as Rullmann & Matthewson (2018) claim. Instead, the results go into the direction of epistemics being able to scope *over* tense in all three languages. This is in line with my hypothesis that cross-linguistically, epistemics take TP-complements. I furthermore find a difference between Dutch on the one hand, and English and French on the other hand: Only for English and French do the results *not* support the availability of epistemics scoping under tense. The difference is in line with the view that the modals differ in their lexical status: Dutch



modals are verbs inside a verb phrase (1) and thus host their own tense position, while French and English modals are functional items in a functional projection above the vP (2). Crucially, this means that English and French modals form a monoclausal structure with the main verb and do not project their own tense (2). As such, they cannot scope under tense. What ties the epistemic modals in monoclausal (2) and biclausal (1) sentences together is that they always take a TP-complement, following the generalization above (Cinque 1999, Hacquard 2006). Therefore, modals in both structures can always scope over the tense in their complement.

- (2) [FP epistemic modal [TP **past tense** [vP verb ]]

### 3.1. Tensed epistemics

The question under discussion is what the *evaluation time* or the *temporal perspective* (Condoravdi 2002) of a modal is. This question is much debated for epistemics: When a speaker utters an epistemic claim, at what time is that claim supposed to hold? For present tense epistemics, as in (3), the evaluation time of the epistemic modal is at speech time: The speaker states that it is necessarily the case *at speech time* that Mary is home.

- (3) Mary has to be home (because I don't see her car anywhere). (epistemic)

The debate in the literature concerns sentences in which a potential marker for past tense is present, such as the past tense morpheme on *had to* in (4). On the surface, a modal like *had to* seems to appear below tense, since it bears tense

morphology. With this scopal relation, the evaluation time of the epistemic modal would be shifted to the past, giving rise to the interpretation "Given what I knew *then*, it *was* necessarily the case that Mary was home" (option i). Alternatively, and unexpectedly from a morphosyntactic perspective, the evaluation time of the epistemic modal is the speech time, while the past tense seemingly applies to the embedded event, giving rise to the interpretation "Given what I know *now*, it is necessarily the case that Mary *was* home" (option ii). Under the second interpretation, which is the interpretation that Stowell (2004), Hacquard (2006, 2010), a.o. argue for, the epistemic modal scopes *over* past tense, while under the first interpretation, which is the interpretation that Rullmann & Matthewson (2018) argue for, the epistemic modal scopes *under* past tense.

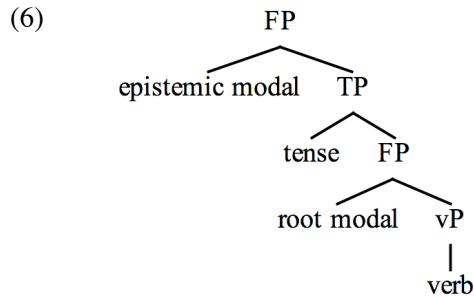
- (4) Mary had to be home. (epistemic)
- Option i. 'Given what I *knew then*, it *was* necessary that Mary was home.'  $\triangleright_{\text{epi}}$
- Option ii. 'Given what I *know now*, it *is* necessary that Mary was home.'  $\text{epi} \triangleright \text{t}$

With past tense root modals, it is always the modal itself that is backshifted: Root modals scope under tense, as in (5), as the interpretation is one of an obligation that held at some point in the past.

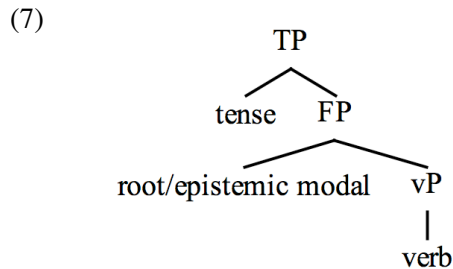
- (5) Yesterday John had to stay home, since his parents told him so. (deontic)

The explanation that Hacquard (2006), following Cinque (1999), proposes is that epistemic modals are in a different structural position than root modals: While

epistemic modals are structurally *high* in the clause, above TP (6), *root* modals scope *under* tense and are thus structurally *low*.



In contrast, Rullmann & Matthewson (2018), argue that past tense epistemics scope *under* tense, and propose that modals are uniformly in a structurally low position (7), regardless of flavor.



While the debate has mainly been focused on English, various studies include a wider variety of languages (French, Hacquard 2006, Laca 2008, Martin 2009; Dutch, (Barbiers 1995, Barbiers 2007, Ter Beek 2010, Rullmann & Matthewson 2018; Git'ksan and St'at'imcets, Rullmann & Matthewson 2018; Bosnian-Croatian-Serbian, Veselinović 2019; a.o.). This is necessary since the structures in (6) and (7) are claimed to hold cross-linguistically and speak directly against each other. Which of the options is correct?

In what follows, I will look at the languages English, French, and Dutch in more detail. This set of languages will provide us with further insight about what matters for the interaction between tense and modality. Even though the modals under consideration in all three languages can carry tense morphology, the way verbs do, I will show that in English and French, a past tense on the modal cannot be interpreted above it, in contrast to Dutch. I argue that this difference follows from the lexical status of the modal – whether the modal is a verb or a functional item. This difference is not always obvious on the surface (chapter 2).

The scopal interaction between epistemic modals and tense in French and Dutch is disputed as in English: For Dutch, Ter Beek (2008) claims that Dutch epistemic modals can scope *over* tense, while Boogaart (2007), Aelbrecht (2010) and Rullmann & Matthewson (2018) claim that both epistemic and root modals scope *under* tense (chapter 2). For French, Hacquard (2006, 2010) and Laca (2008) claim that epistemic modals scope *over* tense, but Martin (2009) claims that epistemic modals can scope *under* tense.

In the next two sections, I will provide further background to the debate in the literature. Since the debate involves differing judgments on identical datapoints, a controlled experiment is necessary. This experiment will be described in section 3.3.

#### 3.1.1. Epistemics scope over tense

The view that epistemic modals scope *over* tense can be found in Groenendijk & Stokhof (1975:68-69), Iatridou (1990), Stowell (2004), Hacquard (2006, 2010, 2011) and Hacquard & Cournane (2016), a.o. Stowell's example is in (8); a context that

helps bring out the intended reading is two speakers discussing how many people were at a party last night. The epistemic modal seems to be evaluated *at speech time*: Given the evidence available at the time of speech, it *is* necessary that there were at least a hundred people at that party last night.

(8) There **had to** be at least a hundred people there.

'There must have been at least a hundred people there.' (Stowell 2004:626)

It could be argued, however, that in this particular example, the evaluation time is in the past and continues to hold: At some time in the past, it *was* necessary given the evidence that was available then that there were at least a hundred people there (Valentine Hacquard, p.c.; for a similar reasoning on different examples, see Rullmann & Matthewson (2018:326)).

In the example in (9) from Hacquard (2010), this analysis is not available, as there is an explicit contrast between a past and a present evaluation time: In the past, Poirot thought that Mary was home at the time of the murder, but more recently, he established that she was home. The question is, can *had to* in this context target the past evaluation time, which would make the sentence true? Hacquard claims the sentence in (9) with the past tense modal is judged as false, which supports the claim that *had to* cannot be used to make an epistemic claim that held at a past time, i.e., the epistemic modal cannot scope under tense.

(9) (Context:) *Imagine that the evidence gathered at the beginning of a murder investigation (a week ago) pointed to Mary being home at the time of the murder:*

*both Mary and her roommate testified that they were having lunch together there. Yesterday however, Poirot established that Mary's roommate had lied, as she was seen by several eyewitnesses elsewhere at that time, debunking Mary's alibi.*

Mary **had to** be home (at the time of the crime).

Hacquard & Cournane (2016) furthermore claim that there is a contrast between epistemic *modals*, such as *have to*, and epistemic *verbs*, such as *seem*: Only epistemic *modals* scope over tense. Hacquard & Cournane first set up a context in which there is again both a past and a present evaluation time, as in (10). They then contrast an epistemic modal claim using *seemed* (10a) with *had to* (10b) and state that while (10a) is false in this context, (10b) is true. From this they conclude that *had to* can target a present evaluation time.

(10) (Context:) *Al has been a prime suspect for a crime that occurred last night in Montreal. Up to now, all of the evidence pointed to him being in Montreal last night. But just now, the detective receives fresh evidence that proves that Al was in fact in DC last night.*

a. It **seemed** that Al was in DC last night/ Al **seemed** to be in DC last night.

b. Al **had to** be in DC last night. (Hacquard & Cournane 2016: 4)

Together, the examples in (8)-(10) support the claim that English epistemic modals *can*, and in fact *must* scope over tense. What is more, the contrast with *seem* shows that this scope relation is specific to epistemic *modals*, as opposed to epistemic

*verbs*: In the exact same set-up, epistemic *modals* target a present evaluation time, while epistemic *verbs* do not.

Besides English *had to*, the claim that epistemic modals scope *over* tense has been made for French (Hacquard 2006, 2008, though see Martin 2009) and Dutch modals (Ter Beek 2008, though see Boogaart 2007, Aelbrecht 2010 and Rullmann & Matthewson 2018). Two initial datapoints are shown in (11)-(12): In these sentences, while the modal itself is in the past tense form, the epistemic claim holds at speech time, as the translations show.

- (11) (Selon la voyante,) Bingley **devait** aimer Jane.

*(According to the fortune teller) Bingley must.IMPV love Jane*

‘Bingley must have loved Mary’.

- (12) (Context: A detective is looking at a call history)

De verdachte **moest** gisteravond dus wel bereik hebben.

*the suspect must.PST last.night thus PRT cell.service have*

‘It is necessary that the suspect had cell service last night.’<sup>25</sup>

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<sup>25</sup> Natural occurring examples that seem to give rise to the same interpretation are in (i)-(iii).

- (i) Ik heb het echt bijna als een gewone menstruatie ervaren maar **moest** dus een  
*I have it really almost as a normal period experienced but must.PST thus a*  
*implantation.bleeding be been*  
 innestelingsbloeding zijn geweest! <https://www.ovulatie-berekenen.com/de-innesteling-en-innestelingsbloeding>  
 ‘I’ve experienced it as almost a regular period but it thus had to be an implantation bleeding.’
- (ii) Anderzijds het **moest** wel een flinke knal zijn geweest, meestal breekt zo iets  
*on.the.other.hand it must.PST PRT a loud bang be been usually breaks such something*  
 nog niet wanneer een gitaar gewoon omvalt.  
*still not when a guitar normally falls.over*  
 ‘On the other hand, it must have been a loud bang, something like that normally does not break when a guitar falls over.’ <http://www.gitaarnet.nl/archive/index.php/t-125225.html>
- (iii) Wat bijzonder, dat **moest** wel even een shock zijn geweest opeens twee kindjes, maar  
*how special, that must.PST PRT PRT a shock be been instantly two children.DIM but*  
 wel echt onwijs leuk!  
*PRT really super nice*

### 3.1.2. Epistemics scope under tense

Von Fintel & Gillies (2007) and Rullmann & Matthewson (2012, 2018), a.o., argue instead that epistemics can (Von Fintel & Gillies 2007), or must (Rullmann & Matthewson 2012, 2018) scope under tense. In what follows, I will present the two ways in which they support this claim: First, they present further examples in which epistemic modals appear to have a past evaluation time. Hacquard (2010, 2016) however counters these arguments and claims that in these examples, a higher temporal operator can backshift the local time of evaluation, which is the epistemic modals' time of evaluation. Second, Rullmann & Matthewson (2018) also re-evaluate the datapoints brought up in favor of the claim that epistemics scope over tense and claim these sentences are 'marginal at best' (section 3.2.1.). The disagreement about which datapoints should be used to show the interaction between epistemic modals and tense, and what the judgment is for these datapoints, demonstrate the need for the experiment in section 3.3.

Rullmann & Matthewson (2018) argue that a past evaluation time for past epistemics is available in natural speech and in construed examples like (13)-(14). In (13a), for instance, the epistemic claim about there being at least a hundred people seems to hold *before* speech time. Rullmann & Matthewson (2018:284) argue that these examples show that in Dutch and in English, 'typically tense scopes above the modal'.

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'How special, that must have been a shock all of a sudden two babies, but definitely super nice!' <https://www.twinkelbella.nl/zwangerschapsupdate-marieke-zwanger-van-een-tweeling/>



- (13) a. When Susan arrived at Bob's house, she saw that the place was packed. There **had to** be at least a hundred people there. But she found out later that actually, there were only 60. (Rullmann & Matthewson 2018:298)
- b. This morning I opened my phone bill and was shocked when I saw that I owed \$10,000. This **had to** be a mistake! Unfortunately, it turned out to be correct. My husband had used my phone on his latest trip to Papua New Guinea, forgetting about the roaming charges. (Rullmann & Matthewson 2018:297)
- (14) *(Context:) I was looking for Jan last night. I had searched all his usual haunts except his house and hadn't found him yet.*
- Jan **moest** wel thuis zijn.  
*Jan must.PST PRT home be*  
 'John had to be home.'  
 (Rullmann & Matthewson 2018:285)

Boogaart (2007) claims that the fact that Dutch past epistemics occur in such contexts shows that Dutch epistemic modals can indeed scope under tense, and Martin (2009) follows this analysis for French. The examples in (13)-(14) have however been reanalyzed by proponents of the view that epistemics scope over tense by arguing that they involve a perspectival shift: the modal's time of evaluation is in the past, but the backshifting is not triggered by the tense of the modal's own clause. First, Hacquard (2010, 2016) uses Boogaart's observation that these contexts are special in that they involve *free indirect discourse* - a discourse in which the perspective is shifted to one of the agents in a story, without it being overtly marked. Hacquard analyzes sentences like (13) on a par with cases of embedded modals (15). She claims that in these cases, epistemics still outscope tense and are as such evaluated at the local time of evaluation: The local time of evaluation, however, is a

salient past time. The epistemic modal is evaluated at the time of the past discourse in (13)-(14), and at the time of the past tense embedding verb in (15).<sup>26</sup>

- (15) Two days ago, Poirot thought that Mary **had to** be the murderer. (Hacquard 2011: 28)

Evidence for the shifted time in cases of free indirect discourse comes from deictic temporal adverbials like *now*, which can refer to the narrator's now in sentences like (13b), as in (16), which is past relative to utterance time (Hacquard 2016:57). The same argument can be made for the Dutch example in (14), shown in (17).

- (16) (*Modification of (9a)*): This morning I opened my phone bill and was shocked when I saw that I owed \$10,000. **Now**, this had to be a mistake! [...]

- (17) (*Same context as (10)*) Jan moest **nu** (wel) thuis zijn.

*Jan must.PST now (PRT) home be*

‘Jan had to be home now.’

von Fintel and Gillies (2008) present another type of example, where the epistemic modal seems to have a past evaluation time, but which does not seem to involve free indirect discourse. The sentence in (18) seems to mean that at a certain

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<sup>26</sup> Note that Rullmann & Matthewson (2018) argue that in embedded contexts, epistemics can be further backshifted. This chapter focuses on epistemics in matrix contexts but these cases will be evaluated in the future.

point before utterance time, Sophie thought it was a possibility that there was ice cream in the freezer, though she no longer believes so.<sup>27</sup>

- (18) (Context:) *Sophie is looking for some ice cream and checks the freezer. There is none in there. Asked why she opened the freezer, she replies:*

There **might have** been ice cream in the freezer.

Hacquard (2006, 2010) notes that this possibility only arises with *why* questions, and analyzes these cases as instances of a covert embedding attitude (19a) (Hacquard 2006), making it similar to the sentences in (13), or a covert *because* (19b) (Hacquard 2010), which is known to be able to shift perspectives (Stephenson 2008).

- (19) a. ~~I thought that~~ there **might have** been ice cream in the freezer.  
b. ~~Because~~ there **might have** been ice cream in the freezer.

Rullmann & Matthewson (2018:324) support von Stechow and Gillies' analysis and argue against Hacquard's solutions in (19), as neither type of context leads to a past evaluation time of a modal by itself. They observe that in both contexts, only *might* with an embedded perfect (*might have*), but not *might* alone can give rise to a past evaluation time (20a), (21). Note moreover that this is a possibility with an *overt* embedding (20b). Valentine Hacquard (p.c.) responds that perhaps the past evaluation of *might* in (20a) and (21) is dispreferred because in the absence of an overt tense

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<sup>27</sup> The past evaluation time of the epistemic in (18) could either arise from the perfect raising over the modal at LF (see Condoravdi (2002) for this analysis for non-epistemic modals), or it could be lexically encoded in the multi-word item *might have* (Rullmann & Matthewson 2018).

marking, the string is compatible with a present evaluation time, and speakers would thus prefer the formulation using *might have*.

- (20) a. ~~I thought that~~ there **might be** ice cream in the freezer.  
       #"At a certain time in the past, it *was* possible that there was ice cream." #past  
       b. I thought that there **might be** ice cream in the freezer.  
       "At a certain time in the past, it *was* possible that there was ice cream." past
- (21) I looked in the freezer because the ice cream **might be** in there.  
       #"I looked in the freezer because at a certain point in the past, it *was* possible that there was ice cream" (Rullmann & Matthewson 2018:324) #past

So far, the disagreement between researchers who claim epistemics scope *over* or *under* tense has been about past tense epistemics in narrative contexts and in answers to *why* questions. While there is agreement that in these contexts, past tense epistemics can be used to express an epistemic claim that held before speech time, there is disagreement about what this shows: For Rullmann & Matthewson (2018), von Stechow & Gillies (2008), Boogaart (2007) and Martin (2009) it shows that past tense can scope over epistemic modals, while for Hacquard (2006, 2010) it shows that in special cases, a higher temporal operator can backshift the local time of evaluation, which is the epistemic modals' time of evaluation. The question that naturally follows is whether outside of these contexts, epistemics scope *over* or *under* tense.

One such case has been discussed for Dutch by Aelbrecht (2010) (see also Janssen 1989, 1994, Verkuyl 2008). Aelbrecht (2010) claims that Dutch epistemics can scope under tense, based on sentences like (22). The first part of this sentence can

be interpreted as 'According to what I knew yesterday, it *was* necessarily the case that he had been in Portugal on his birthday'. The possibility is evaluated at a past time that the speaker contrasts with speech time (*but the new evidence indicates...*). Note that an alternative analysis involving context shift such as in (13)-(14) above is not available for sentences like (22): While in (13)-(14), the preceding discourse is in the past, here, there is no further discourse present. The English translation does not sound acceptable to the native speakers I asked (23). The experiment presented in section 3.3. will test this judgment in a controlled set up.

- (22) Gisteren **moest** hij nog in Portugal geweest zijn op zijn verjaardag, maar het *yesterday must.PST* he still in Portugal been *be* on his birthday *but the* nieuwe bewijsmateriaal toont aan dat dat een foute conclusie was. *new evidence shows on that that a wrong conclusion was*  
 'Yesterday it was still necessarily the case that he had been in Portugal on his birthday, but the new evidence indicates that that conclusion was wrong.'

(Aelbrecht 2010:34, my translation)

- (23) ??Yesterday, he had to be in Portugal on his birthday, but the new evidence shows that that was a wrong conclusion.

Going back to English, Hacquard (2006, 2010, 2016) and Hacquard & Cournane (2016) discuss sentences outside of narrative contexts and *why* questions, in which they claim past tense epistemics are evaluated at speech time (section 3.2.2.1.). Rullmann & Matthewson (2018) however claim that sentences like the ones in (24) are judged 'marginal at best'.

- (24) (Context:) *Up until just now, all of the evidence pointed to Mary being home last night. But now, fresh evidence proves that Mary's home was empty last night.*

Mary **had to** be out last night.

(Rullmann & Matthewson 2018:326)

Rullmann & Matthewson ran a survey on 8 native speakers of English who judged sentences like (24) on a scale from 1-3. They report that 3/8 judged (24) as 'marginal'. What is more, only 3/8 speakers accept Stowell's original sentence from (8) in context (*There **had to** be at least a hundred people there*). They furthermore constructed their own example (25), which is judged as infelicitous or marginal by 6/7 speakers they consulted.<sup>28</sup>

- (25) (Context:) *A mother is wondering what her son got up to at a party last night. He emerges from his room holding his head and looking green. She says:*

You **had to** be drunk.

(Rullmann & Matthewson 2018:300)

For Dutch, Rullmann & Matthewson (2018:326) claim that epistemic modals do not have a reading available in which they outscope tense. Boogaart (2007) says that this reading is available for the possibility modal *kunnen* (26), but not for *moeten*. Rullmann & Matthewson (2018:290) claim however for (26) that the morpheme does not express past tense, but rather, 'modal remoteness' (Huddleston & Pullum 2002:148–51) or 'nonreality' (Geerts et al. 1984:466–72). As the translation indeed

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<sup>28</sup> See Goodhue, Hacquard & Williams (in progress) for the proposal that the use of *have to* requires contexts different from *must*, and that the context in (25) is not a context in which *have to* can occur, which might be responsible for the infelicity of (25).

indicates, there does not seem to be a semantic past in this sentence at all, as the event of being ill is not backshifted with respect to the modal.

- (26) Hij **kon** (wel eens) ziek zijn. (Boogaart 2007:50)  
*He can.PST (PARTICLE sometimes) ill be*  
'He could be ill.'

The contradicting claims about the datapoints are intriguing, and call for further investigation. In van Dooren (2020), I ran two quantitative studies on English and Dutch, which provide initial evidence in favor of the view that epistemic modals in both languages can scope *over* tense, and that epistemic modals in English cannot scope *under* tense. I ran an online Truth Value Judgment Task on English and Dutch, and an Acceptability Judgment Task on English alone. My goals were twofold. First, does the low acceptability for past tense modals with a present evaluation time in Rullman & Matthewson's study reflect the unavailability of past epistemics to be evaluated at speech time, or a mere dispreference for how to express such epistemic claims? What could influence the judgment of sentences like (24) is a preference for sentences like *Mary must have been out/Mary has to have been out* (or even *Mary was probably out*) in these contexts. Note that sentences with past tense modals are very rare: In an English and a Dutch corpus on child-directed speech (the Manchester Corpus (Theakston et al. 2001) and the Groningen Corpus (Wijnen & Verrips 1998) on the CHILDES database (MacWhinney 2000), respectively), both containing over 200,000 utterances, Hacquard (2019) found 1 English past tense epistemic, and van Dooren et al. (2017) found 8 Dutch past tense epistemics. Second, I ran the

experiment in English and Dutch to find out whether the modals behave similar in the two languages.

For the Truth Value Judgment Task, I set up 8 contexts similar to the one in (27), in which evidence is presented at two different points in time, past and present. Each context was followed by one of four types of test sentences involving *seemed* or *had to*: Two sentence types targeted the past evaluation time (for the context in (27), *Al seemed/had to be in Montreal last night*), and two sentence types targeted the present evaluation time (*Al seemed/had to be in DC last night*). Since *seemed* scopes under tense, this task can test whether there is a contrast between *seemed* and *had to*, which would support the view that *had to* does not scope under tense, or whether they behave the same, which would support the view that *had to* scopes under tense. Per language, 40 participants were asked whether the sentence is true or false.

(27) *Al has been a prime suspect for a crime that occurred last night in Montreal. Up to now, all of the evidence pointed to him being in Montreal last night. But just now, the detective receives fresh evidence that proves that Al was in fact in DC last night.*

- a. The detective says: *Al had to be in DC last night.*
- b. The detective says: *Al seemed to be in DC last night.*
- c. The detective says: *Al had to be in Montreal last night.*
- d. The detective says: *Al seemed to be in Montreal last night.*

I find that for both English and Dutch, sentences containing *had to* (for Dutch: *moest*) that target a *past* evaluation time are judged false more than expected by chance, and the sentences that target a *present* evaluation time are judged false less



than expected by chance. This is in line with the hypothesis that epistemics in these languages scope *over* tense. However, the controls with *seemed* are judged similarly to the sentences with *had to*, especially in English, with sentences like *Al seemed to be in Montreal* following a context like (27) being judged true more than expected by chance. What is more, what Rullmann & Matthewson (2018) claim is that the sentences with *had to* and *moest* are infelicitous (Rullmann & Matthewson 2018), which means that an Acceptability Judgment Task, which asks whether or not a sentence sounds felicitous, is more appropriate than a Truth Value Judgment Task.

In a second experiment, which I only ran on English, I forced both *have to* and *seemed* to be interpreted with a present evaluation time. Similar to the Dutch sentences in (22), the trials contain a direct contrast between the epistemic modal and an updated belief, as in (28).<sup>29</sup> Since the follow-up ('it actually isn't') contains a present epistemic claim, the contrast with the first part of the sentence forces an interpretation of a past epistemic claim. The prediction is that if *have to* can scope under tense, these sentences will be felicitous, while they will be infelicitous if *have to* scopes over tense. 30 participants were asked whether the sentence is true or false.

- (28) A professor of ancient Greek culture discusses the ideas of some early philosophers. He says: The ancient Greeks worried much about astronomy, but they had some beliefs that have since been shown to be false. For instance, *While the earth **had to** be stationary, it actually isn't*.
- a. *While the earth **had to** be stationary, it actually isn't*.
  - b. *While the earth **seemed** to be stationary, it actually isn't*.

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<sup>29</sup> This set-up was suggested by Alexander Williams.

The finding is that the sentences with *seemed* are judged as felicitous more than expected by chance, while the sentences with *have to* are not. While the acceptability rate for *have to* was about 40%, the difference with *seemed* provides initial support for the claim that English *have to* cannot scope over tense in non-narrative contexts. The same question arises naturally for Dutch and French, for which the data are similarly disputed.

### 3.1.3. Summary of the debate: The need for an experiment

This summary of the debate on the interaction between epistemic modals and tense justifies conducting an Acceptability Judgment Task on past tense epistemics in English, French, and Dutch: There is disagreement about the judgments, and while we have seen initial evidence that English *have to* cannot scope under tense, the same task did not ask whether *have to* can scope over tense.

Note that multiple forms with a potential past tense marker have been discussed: Both past tense modals, like *had to*, and modals with an embedded temporal auxiliary, like *might have been*, have been included in the discussion. The experiment will focus on modals in the past tense form as the judgments themselves have been disputed for sentences containing this form of the modal.

### 3.2. Experimental data<sup>30</sup>

An online experiment was run on native naïve speakers of English, Dutch, and French. Participants were recruited using Amazon Mechanical Turk

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<sup>30</sup> This experiment was conducted with Anouk Dieuleveut.

([www.mturk.com](http://www.mturk.com)) for English and Prolific ([www.prolific.com](http://www.prolific.com)) for Dutch and French.

The experiment was an Acceptability Judgment Task, in which participants were asked whether a sentence with either a past tense epistemic modal (*had to*) or the past tense verb *seemed* sounded sensible or not. On the assumption that *seem* scopes under tense, the comparison with *had to* will inform us whether epistemic modals can also scope under tense.

### 3.2.1. Methods

The experiment was run online on IBEX. Participants were asked to judge sentences of the format in (29), where P and Q are mutually exclusive. They were first asked to indicate whether the sentence was *sensible* vs. *nonsensical* (*Acceptability judgment task*). Second, they were asked to put a bet on one of the two options (P vs. Q) (*Betting task*). For the Acceptability judgment task, where subjects had to choose whether the detective is speaking in a “sensible” or “nonsensical” way. For the Betting task, the question was: "If you had \$100 to bet on *what really happened*, how would you distribute your money?" They could distribute their bet in 5 different ways, going from \$100 on P and \$0 on Q, to \$75 on P and \$25 on Q, \$50 on P and \$50 on Q, \$25 on P and \$75 on Q, and \$0 on P and \$100 on Q.

(29) It{had to/seemed to me} that P, {but now I know/but I thought} that Q.

Test sentences were constructed in the following way: The first part of the sentence introduces either an epistemic modal (*have to*) or the verb *seem*, bearing past tense morphology. This part introduces the first epistemic claim (had to/seemed P).

The second part of the sentence (*continuation*) contains a second epistemic claim that contrasts with the first one: One continuation is ‘but now I know that Q’ (+*know*), where P and Q are mutually exclusive. This continuation should result in a sentence that is *contradictory* if the first epistemic claim holds *at speech time*, but *non-contradictory* if the first epistemic claim is taken to hold *at a time before speech time*. The other continuation is ‘but I thought that Q’ (+*thought*), which should result in a sentence that is *non-contradictory* if the first epistemic claim is taken to hold *at speech time*, but *contradictory* if the first epistemic claim is taken to hold at a time before speech time. An example for all four types of sentences is provided in (30); all materials are in Appendix A.

(30) Examples of test sentences for English:

- a. (*hadto, know*) There **had to** be more than 100 people at the party last night, **but now I know** that there were less than 60.
- b. (*seemed, know*) There **seemed to me** to be more than 100 people at the party last night, **but now I know** that there were less than 60.
- c. (*hadto, thought*) There **had to** be more than 100 people at the party last night, **but I thought** that there were less than 60.
- d. (*seemed, thought*) There **seemed to me** to be more than 100 people at the party last night, **but I thought** that there were less than 60.

Overall, participants had to judge 16 sentences in the experiment, 8 test cases (4 ‘...*but now I know that Q*’, 4 ‘...*but I thought that Q*’) and 8 fillers. The fillers were similar to the test sentences in that two claims were contrasted in the same

sentence: these claims were either contradictory or non-contradictory, and in both cases connected by the phrase "and indeed". While the non-contradictory claims were expected to be judged as sensible (*yes*-controls), the contradictory claims were expected to be judged as nonsensical (*no*-controls). An example is provided in (31).

(31) Examples of filler sentences for English:

- a. YES (sensible): Aron is American, and indeed, he was born in New York.
- b. NO (nonsensical): Aron is American, and indeed, he is Italian.

Examples of stimuli are given in Figure 1 (test case with English *hadto+know*) and Figure 2a/b (yes/no fillers). (32) summarizes the experimental procedure. We ran the same experiment on Dutch, English and French. (33) summarizes the conditions. Continuation (*+know/+thought*) was tested within subjects, Lemma (*hadto/seemed*) and Language (Dutch/English/French) between subjects.

(32) Experimental procedure:

- 1. Instructions
- 2. Training: 3 example sentences (*sensible, nonsensical, sensible*)
- 3. Test phase: 16 sentences: 8 fillers (4 *yes*, 4 *no*);

8 trials (4 + '*now I know...*', 4 + '*but I thought...*' )

Mean duration of the experiment: <10 minutes

(33) Conditions:

- a. Language (between subjects): Dutch (D), English (E), French (F)

- b. Lemma (between subjects): *had to* vs. *seemed to me*  
 (Dutch: *moest* vs. *leek me*;  
 French: *devait* vs. *me semblait*)
- c. Continuation (within subjects): *know* vs. *thought*  
 (Dutch: *wist* vs. *dacht*;  
 French: *sais* vs. *pensais*)

### 3.2.2. Predictions

The hypothesis stated at the beginning of this chapter is that epistemic modals in Dutch are *verbs*, and as such they can scope above tense (the tense of their complement), and below tense (the tense of their own clause), while functional epistemic modals, as French and English modals are supposed to be, can only scope above tense. We have the following predictions (Table 1): Recall that the continuation “but now I know that Q” requires that the first sentence be evaluated at a time prior to the speech time to avoid a contradiction, while the continuation “but I thought that Q” requires that the first sentence be evaluated at speech time to avoid a contradiction. For all languages, participants should be able to interpret the epistemic modal *above* Tense (epi > Tense), and we therefore predict that they should accept sentences ‘had to P... but I thought that Q’. We further predict that Dutch participants should also be able to interpret the epistemic modal *below* Tense (Tense > epi), and thus accept sentences ‘had to P... but now I know that Q.’ We predict that English and French participants, on the other hand, will reject these sentences.

For our controls, we predict that participants should accept sentences ‘seemed to me P... but now I know that Q.’, and reject ‘seemed to me P... but I thought that

Q.’ Note that for the *seem* condition, we added ‘to me’ to make sure that *seemed* and *thought* in (30d) are evaluated by the same individual (if they are evaluated by different individuals, ‘seemed to me P... but I thought that Q.’ is non-contradictory).

We predict a difference between *had to* and *seemed* if the former can be interpreted above tense, since *seemed* cannot.

Table 1: Expected answers on Acceptability Judgment task

Example	Condition	Dutch	English	French
There <b>had to</b> be more than 100 people at the party last night, <b>but now I know</b> that there were less than 60.	<i>had to</i> + <i>know</i>	OK	Bad	Bad
There <b>seemed to me</b> to be more than 100 people at the party last night, <b>but now I know</b> that there were less than 60.	<i>seemed</i> + <i>know</i>	OK	OK	OK
There <b>had to</b> be more than 100 people at the party last night, <b>but I thought</b> that there were less than 60.	<i>had to</i> + <i>thought</i>	OK	OK	OK
There <b>seemed to me</b> to be more than 100 people at the party last night, <b>but I thought</b> that there were less than 60.	<i>seemed</i> + <i>thought</i>	Bad	Bad	Bad

We use the Betting task as a control for attentiveness in our participants. For the sensible fillers, they should select the option that is consistent with the sentence; for the nonsensical fillers, participants might use the 50/50 options. Note that we only

use the betting task as a control for the sensible sentences, as we were not giving specific instructions to the participants about what to bet for nonsensical utterances.

**Figure 1.** Example of a stimulus (English *hadto* + *know*):

The detective says:

**"There had to be more than 100 people, but now I know that there were fewer than 60."**

*The detective is speaking in a...*

☒ nonsensical way      ☐ sensible way

*If you had \$100 to bet on what **really** happened, how would you distribute your money?*

There were more than 100 people      There were fewer than 60 people

☐ 100/0      ☐ 75/25      ☒ 50/50      ☐ 25/75      ☐ 0/100

[→ Click here to continue](#)

**Figure 2.** Examples for controls:

**a. Control 'yes' (sensible)**

The detective says:

**"I thought that Ben was a vegetarian, and indeed he doesn't eat meat."**

*The detective is speaking in a...*

☐ nonsensical way      ☒ sensible way

*If you had \$100 to bet on what **really** happened, how would you distribute your money?*

Ben doesn't eat meat      Ben eats meat

☒ 100/0      ☐ 75/25      ☐ 50/50      ☐ 25/75      ☐ 0/100

[→ Click here to continue](#)



Expected answers:

Acceptability Judgment task: *sensible*

Betting task: 0 or 100

**b. Control ‘no’ (nonsensical)**

The detective says:

**"I thought that Aaron was American, and indeed he is Italian."**

The detective is speaking in a...

☒ nonsensical way      ☐ sensible way

If you had \$100 to bet on what *really* happened, how would you distribute your money?

Aaron is American      Aaron is not American

☐ 100/0      ☐ 75/25      ☒ 50/50      ☐ 25/75      ☐ 0/100

[→ Click here to continue](#)

Expected answers:

Acceptability Judgment task: *nonsensical*

Betting task: 50/50

**Statistical analysis.** Data analyses were conducted using R (R Core Team, 2013), using the package lme4 (Bates, Maechler, Bolker, & Walker, 2014a, 2014b). We use binomial linear mixed effects model, built with a maximal random effect structure based on subjects and items as random variables. We sometimes step back to random-intercepts-only models when the model fails to converge with the full random-effects specification (following Barr, Levy, Scheepers, & Tily, 2013).

### 3.2.3. Results

**Participants.** 180 participants were recruited using Amazon Mechanical Turk for English, and Prolific for Dutch and for French (60 per language: *had to*: 30, *seemed*: 30; 4 groups for counterbalancing) (mean age: Dutch: 26.5; English: 37.6; French: 28.2; Dutch: 21 females; English: 19 females; French: 24 females). We excluded 2 participants based on a native speaker check presented at the beginning of the experiment (1 Dutch, 1 French). We excluded 25 participants because they had low accuracy on controls (details Table 2) (Dutch: 8, English: 7, French: 10). We therefore report results for 153 participants (Dutch: 51, English: 53, French: 49).

Table 2. Number of participants in each group after exclusion

	Dutch	English	French
<i>had to</i>	26	25	25
<i>seemed</i>	25	28	24

#### ***Results on fillers.***

***Results for Acceptability Judgment task.*** The average mean on fillers is high (<90%) (Table 3). There is also high consistency across all 8 fillers, showing they are all lead to < 90% accuracy, regardless of the language).

Table 3: % accuracy on fillers (Acceptability Judgment task)

	Dutch	English	French
All controls	97.7%	92.1%	91.0%
yes-controls ( <i>sensible</i> )	98.3%	95.8%	94.6%
no-controls ( <i>nonsensical</i> )	97.1%	88.3%	87.5%

**Participant exclusion.** We excluded 19 participants (10.6%) who made more than 2 errors on the Acceptability Judgment task (out of 8 fillers) (Dutch: 3, English: 7, French: 9).

**Results for Betting task.** The mean of correct answers for the Betting task (on sensible fillers) is 89.3% (Table 4).

Table 4. % accuracy on fillers per language (Betting task)

	Dutch	English	French
Mean accuracy (for yes-control)	84.2%	97.1%	86.8%

**Participant exclusion.** We excluded 7 participants (Dutch: 5, English: 0, French: 2) who made 2 or more mistakes on the bet (out of 4 yes-controls). Note that this is based only on trials where the expected and given answer for the Betting task is *sensible*. We consider as ‘correct’ answering 25 or 0 for [0], and answering 75 or 100 for [100].

### *Test cases*

**Mean of 'sensible' answers on Acceptability Judgment task.** Table 5 and Figure 4 summarize the results for each condition for the 3 languages (% of 'sensible' answers). For the controls with *seemed*, we find that participants accept them with *+know* at high rates (~ 80%), and tend to reject them with *+thought* (~20%). This is as expected, since *seemed* has to report a *past* seeming state. Comparing these results to *had to*, we find a significant difference in almost all cases: For French, we find that participants accept *had to* + *thought* at a higher rate than *seemed* + *thought*, and *had to* + *know* at a lower rate than *seemed* + *know*. For English, we find that participants accept *had to* + *know* at a lower rate than *seemed* + *know*, while the model fails to converge for the *+thought* condition. For Dutch, finally, participants accept *had to* + *thought* at a higher rate than *seemed* + *thought*, but we do not find a difference between *had to* and *seemed* for the *+know* continuation (Table 6). For all languages, we do not find a full reversal of the *had to* results as compared to the *seemed* results (participants accept *had to* with *+know* at a higher rate (~70%) than *had to* + *thought* (~50%)). There is however a clear interaction effect Lemma\*Continuation for all three languages (Table 8).

Table 5: Proportion of ‘sensible’ answers per condition for Dutch, English and French (n=153)

	Test ( <i>hadto</i> )		Control ( <i>seemed</i> )	
	+know	+thought	+know	+thought
Dutch	78.8%	54.8%	85.0%	23.0%
English	52.0%	40.0%	79.5%	24.1%
French	70.0%	57.0%	90.6%	24.0%

Figure 4: Proportion of ‘sensible’ answers by condition (Dutch n= 51; English n=53; French n=49)

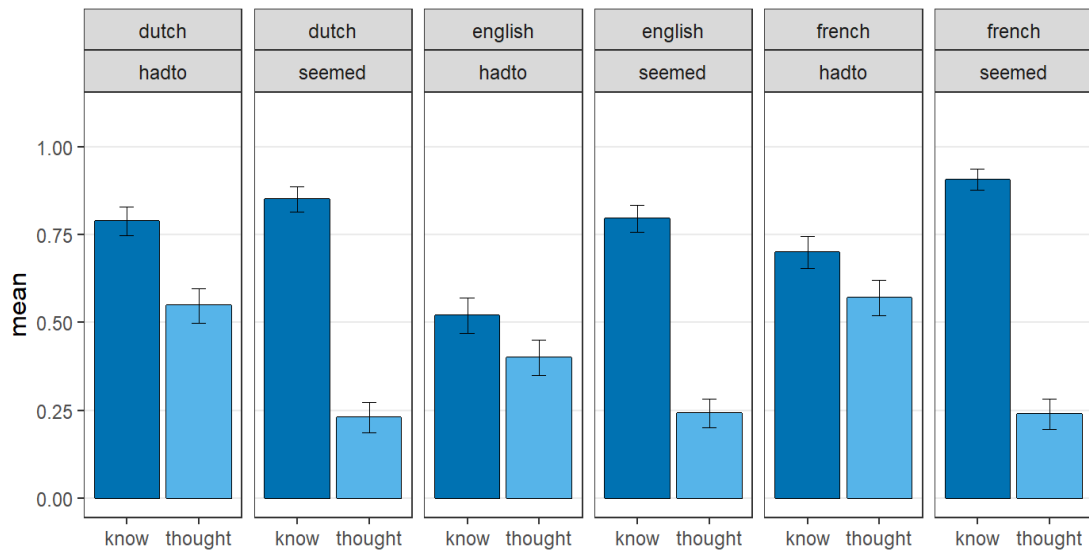


Table 6. Main effect of LEMMA (*hadto* vs. *seemed*)

	+know	+thought
Dutch	$\chi^2(1) = 0.904, p = 0.341$	<i>FTC with full specification (m1)</i> $\chi^2(1) = 13.1, p = 0.00029 ***$
English	$\chi^2(1) = 10.8, p = 0.001 **$	<i>FTC</i>
French	$\chi^2(1) = 5.00, p = 0.0253 *$	$\chi^2(1) = 14.8, p = 0.0001 ***$

Table 7. Main effect of CONTINUATION (*know* vs. *thought*)

	hadto	seemed
Dutch	<i>FTC with full specification (m1)</i> $\chi^2(1) = 15.9, p = 6.59e-05 ***$	<i>FTC with full specification (m2)</i> $\chi^2(1) = 96.3, p < 2.2e-16 ***$
English	$\chi^2(1) = 3.49, p = 0.061$	$\chi^2(1) = 84.8, p < 2.2e-16 ***$
French	$\chi^2(1) = 4.08, p = 0.043 *$	$\chi^2(1) = 110.7, p < 2.2e-16 ***$

Table 8. Interaction CONTINUATION\*LEMMA

Dutch	$\chi^2(1) = 20.3, p = 6.5e-06 ***$
English	$\chi^2(1) = 26.6, p = 2.46e-07 ***$
French	$\chi^2(1) = 41.2, p = 1.06e-10 ***$

**Effect of language** (2 by 2 comparisons). We find no difference between languages for *seem* (Table 8). There is no interaction effect (Table 10). Note that we find that

English *had to* is also (overall) less felicitous than its Dutch and French counterparts (Table 9).

Table 9. Effect of LANGUAGE

	<i>hadto</i>	<i>seemed</i>
Dutch	vs. $\chi^2(1) = 10.6, p = 0.0011^{**}$	$\chi^2(1) = 0.1598, p = 0.689$
<b>English</b>		
Dutch	vs. $\chi^2(1) = 0.336, p = 0.562$	$\chi^2(1) = 0.364, p = 0.546$
French		
<b>English</b>	vs. $\chi^2(1) = 8.45, p = 0.0036^{**}$	$\chi^2(1) = 1.096, p = 0.295$
French		

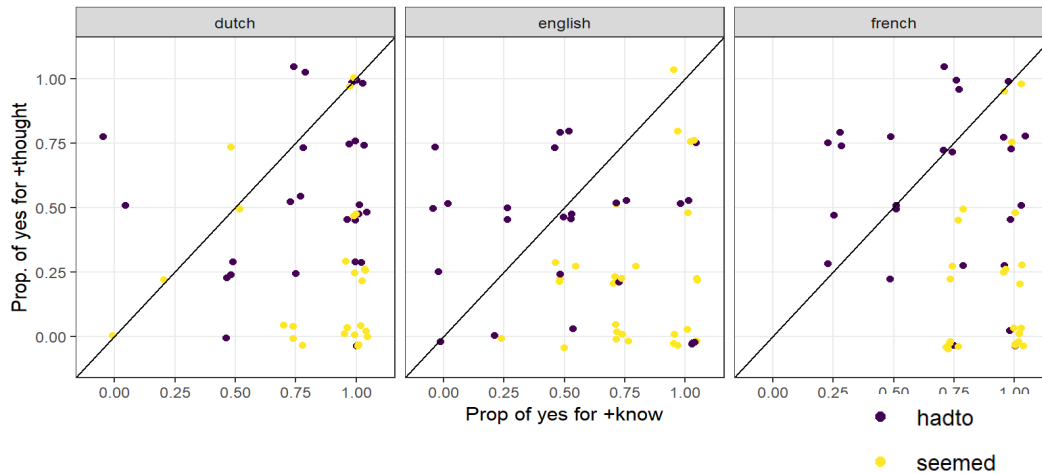
Table 10. Interaction LANGUAGE\*CONTINUATION

	<i>hadto</i>	<i>seemed</i>
Dutch	vs. $\chi^2(1) = 2.54, p = 0.11$	$\chi^2(1) = 1.6579, p = 0.197$
<b>English</b>		
Dutch	vs. $\chi^2(1) = 2.11, p = 0.146$	$\chi^2(1) = 0.1612, p = 0.688$
French		
<b>English</b>	vs. $\chi^2(1) = 0.0158, p = 0.89$	$\chi^2(1) = 3.4197, p = 0.064$
French		

**Difference by subject** In Figure 5, each dot corresponds to a participant. Yellow dots correspond to participants from the *seemed* condition, while purple dots correspond to participants from the *had to* condition. The y-axis corresponds to the proportion of ‘sensible’ answers given for the *+thought* continuations (out of 4 trials), and the x-axis to the proportion for the *+know* continuations. A participant that would always reject a sentence with *had to* would appear in the left bottom corner (0;0); a participant always accepting would appear in the right up corner (100:100).

*Seemed* (yellow dots) participants are distributed across the bottom part of the graph (right to the diagonal). *Had to* (purple dots) participants do not show a clear pattern; instead, they are spread.

Figure 5. Answers by subject for *seemed* (yellow) and *hadto* (purple) (*seemed*: 77 participants across the 3 languages; *hadto*: 76 participants)



### 3.2.4. Discussion

In Dutch, English, and French, the verb *seemed* scopes under tense: In a set-up in which a past epistemic claim expressed by *seemed* is contrasted with a present

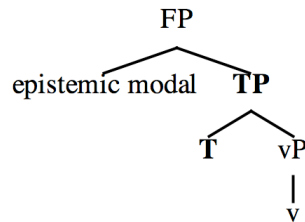


epistemic claim expressed by *know*, which are mutually exclusive, participants judge sentences in which *seemed* is used to express the past epistemic claim as 'sensible'. In contrast, they judge sentences in which *seemed* is used to express the present epistemic claim as 'nonsensical'. This is what we expected. We find moreover that the modals in Dutch, English, and French do not behave like *seemed*: In all languages, when *had to* (*moest, devait*) is used to express a present epistemic claim (continuation with *thought*), the sentence is judged as significantly more 'sensible' than with *seemed*. In English and French, moreover, the sentence is judged as significantly less 'sensible' than with *seemed* when *had to* (*/devait*) is used to express a past epistemic claim (continuation with *know*). For Dutch, in contrast, we do not find a significant difference between the epistemic modal and the epistemic verb.

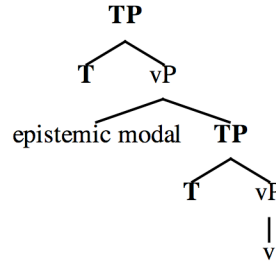
Compared to the baseline provided by *seemed*, these results are unexpected if epistemic modals must scope under tense (Rullmann & Matthewson 2018). The results are encouraging for the claim stated at the beginning of this chapter, namely, that cross-linguistically, epistemic modals take a TP-complement and thus scope over tense. What is more, the results are in line with my proposal that the lexical status of the modal matters: while French and English modals differ from *seemed* in both continuations, the Dutch modal does not differ from *seemed* in the continuation with *know*. This is expected under an analysis in which French and English epistemic modals are functional modals in a monoclausal structure, while Dutch epistemic modals are verbs in a biclausal structure. Functional modals do not host their own tense projection, and therefore only have one possible interpretation for a tense marker: The TP in their complement (34). Modal verbs, on the other hand, are verbs

that host their own tense projection, which provides a second interpretation site for tense markers: The TP in the modals' own clause (35). If the past tense marker is interpreted in the TP above the modal, the resulting interpretation is one in which the epistemic modal scopes under tense, similar to *seemed*.

(34) functional modal



(35) modal verb



There are however important patterns that are not predicted under my analysis, and follow-up experiments are necessary to further understand what causes these patterns. First, why is the acceptance of *had to* with a continuation with *thought* quite low in all three languages, and the acceptance of *had to* with a continuation with *know* quite high in English and French? Part of the explanation for the results with *know* could be one context in which the two options are not entirely mutually exclusive, and as a result, no contradiction ever arises. Part of the explanation for the results with *thought* could be that the contrast between the two epistemic claims was not strong enough: If there is not enough focus on the contrast between the two evaluation times in sentences like (36), participants might simply contrast 'there were more than 100 people' and 'there were less than 60' and as a result, reject the sentence. This can be remedied in a follow-up experiment by putting more focus on the contrast itself, by adding for instance "but **at the time, I thought** that...".

- (36) There **had to** be more than 100 people at the party last night, **but I thought** that there were less than 60.

An explanation that we can rule out is that there is a split between participants: It is not the case that some participants treat *had to* like *seemed*, while others provide opposite judgments. The graph that shows the results from each individual participant (Figure 5) does not show a split between participants, but instead, an overall lower acceptability for *had to* with each continuation in English as compared to French or Dutch.

Our results show that the “but I know Q” continuation is more acceptable in Dutch than English or French. I interpret this result as showing that Dutch epistemic can have a past temporal perspective. But an alternative possibility is that the modals differ in *veridicality* (Karttunen 1972, von Stechow & Gillies 2010, Lassiter 2016)<sup>31</sup>: If the English and French modals are veridical, saying “it had to be raining, but now I know that it was not” could be contradictory, because it would both entail that it was raining and that it was not., irrespective of whether the modal has a past temporal perspective. So if these sentences are not acceptable in English and French, but they are acceptable in Dutch, could it be because *have to* and *devoir* are veridical but *moeten* is not, while all languages in fact allow for a past temporal perspective? I leave this possibility for future research.

The overall lower acceptability in English is a second pattern that needs to be explained. Is a comparison between English *have to*, French *devoir* and Dutch *moest*

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<sup>31</sup> Thanks to Paolo Santorio for pointing out this possibility.

warranted, or is English *have to* different to begin with? One way in which *have to* is special is suggested by Goodhue et al. (*in progress*): The English modal *have to* seems to require particular licensing conditions as compared to *must*, which are mainly linked to the strength of the evidence available. This could mean participants reject sentences not based on the evaluation time of the modal, but instead, based on the fact that the context does not license the use of *have to* to begin with.

In general, the experiment has failed to find epistemic modal sentences that were clearly acceptable, irrespective of temporal perspective. As mentioned in section 3.1.1., this might be due to a preference for sentences that were not tested here that would not use past tensed epistemics, but for instance, present tense modals with an embedded perfect (e.g., *must have*).

### 3.3. The status of a cross-linguistic constraint

In this chapter, I showed that cross-linguistically, epistemic modals do not behave like a verb like *seem*. While follow-up experiments are necessary, the results of the experiment on English, French, and Dutch seem to go into the direction of the following two patterns: English and French modals differ from *seem* in that they do not scope under tense as easily, and scope over tense more easily; Dutch epistemic *must* differs from *seem* only in that it scopes over tense more easily. Both patterns can be captured by (a) an analysis of modals that are different in terms of lexical category (modal verbs vs. functional modals), and more importantly (b) a cross-linguistic generalization that states that modal flavor is restricted by the type of complement the modal takes: Epistemic modals combine with a TP. This restriction distinguishes

epistemic modals from root modals, which can only scope under tense and thus do not take a TP-complement.

In the next chapter, I will discuss the second syntactic restriction on modal flavor that is central in this thesis, which will at the same time provide further support for the claim that epistemics, but not roots, take a tensed complement.

## Chapter 4: Non-verbal complements of modal verbs

In chapter 2 I presented my analysis of the structure of Dutch modal sentences and provided evidence in favor of the claims that Dutch modals are *verbs* (and not *functional items*). This claim can explain certain cross-linguistic differences between Dutch modals and modals in other languages, which were discussed in chapter 3. At the same time, I argue that the following generalizations concerning the link between modal complement size and modal flavor hold for all languages discussed, which thus have the potential to be universals:

**Generalization:** Modals combine with different sizes of complements depending on

their modal flavor, namely:

- *epistemics* combine with a Tense Phrase; (Cinque 1999, Hacquard 2006)
- *roots* combine with smaller phrases: (Rubinstein 2019)
  - *deontics* combine with an Aspectual Phrase
  - *teleologicals* can combine with even smaller phrases

In this chapter, I will show how modals with non-verbal complements fit in with the above generalizations. In contrast to modals with verbal complements, modals with non-verbal complements are restricted in the flavors they can express. I argue that despite surface appearances, the same restrictions apply across languages, with the Dutch phenomenon providing further support for Rubinstein's (2012) claim that deontic modals are limited to verbal complements, and Cinque (1999), Hacquard

(2006) et al.'s claim that epistemic modals are limited to complements that include tense.

#### 4.1. Restrictions on modals with non-verbal complements

In many Germanic languages (Barbiers 1995, van Riemsdijk 2002, 2009, Eide 2005, van Dooren 2014), as well as some non-Germanic languages such as Hebrew (Rubinstein 2012), modals can take complements that do not appear to contain a verb (1). Unlike modals with overt verbs in their complement (2), modals with non-verbal complements are restricted in the flavors they can express. A first restriction I will discuss in this chapter is that modals cannot have an *epistemic* modal flavor when they combine with an NP, PP or AP (Barbiers 1995): While (2) can be used to express the possibility of having a fence given what is known (2i), sentence (2) cannot have the same interpretation. The modal is instead restricted to root flavors.

- |     |  |            |
|-----|--|------------|
| (1) | Mijn grootouders moeten <b>een hek</b> .                               | Dutch      |
|     | <i>my grandparents must a fence</i>                                    |            |
|     | i. #'My grandparents must have a fence (they're very private people).' | *epistemic |
|     | ii. 'My grandparents must have a fence (the mayor tells them to).'     | ✓root      |
| (2) | Mijn grootouders moeten <b>een hek hebben</b> .                        | Dutch      |
|     | <i>my grandparents must a fence have</i>                               |            |
|     | i. 'My grandparents must have a fence (they're very private people).'  | ✓epistemic |
|     | ii. 'My grandparents must have a fence (the mayor tells them to).'     | ✓root      |

Why would there be a restriction on epistemic flavor, which moreover seems to be cross-linguistically stable (cf. Rubinstein 2012, Harves 2017)? Given the generalizations central in this thesis, the absence of an epistemic flavor in sentences like (1) is not surprising: As stated above, epistemic modals need a Tense Phrase complement. The complement in (1) does not seem to contain a verb, let alone tense, which would mean it is too small for an epistemic flavor to arise.

The second restriction on modal flavor when the modal combines with a non-verbal complement shows variation across languages. Based on data from Hebrew, English *need* and Hindi-Urdu, Rubinstein claims that modals with an NP-complement cannot have a *deontic* flavor. Instead, only a goal-oriented or *teleological* flavor is available. The data for Hebrew are in (3): The context in (3) forces a deontic interpretation since the neighbor and their speaker are *obliged* to get a fence (deontic modality), even though they do not *need* it (teleological modality). In this context, the Hebrew modal *ḡayav* 'must' with a verbal complement is judged as true (3a), but the same modal with an NP-complement is judged as false (3b). This shows that *ḡayav* 'must' with a non-verbal complement cannot have a deontic interpretation (Rubinstein 2012:163).

- (3) City regulations mandate that home owners put up fences between their properties. You and your neighbor get along very well without a fence. In fact, both of you object to a fence because it would have to go right on top of the beautiful flower beds that have been flourishing between your two properties. You say to your neighbor:
- a. *ḡayav-im livnot kan gader.*                      ✓epistemic, ✓deontic, ✓teleological  
*must-M.PL build.INF here fence*



'A fence needs to be built here.'

b.  $\chi$ ayav-im kan gader. \*epistemic, \*deontic, ✓teleological

*must-M.PL here fence*

'We need a fence here.'

Rubinstein states that cross-linguistically, only modals with a verbal complement can have a deontic interpretation, while teleological modals are not restricted in the same way. Dutch appears to go against this cross-linguistic restriction, however: In the same context in (3), a Dutch modal with a non-verbal complement as in (4) is judged true. As we will see, Dutch modals with non-verbal complements can always have a deontic flavor, along with a teleological flavor.

(4) Mijn grootouders moeten een hek.

*my grandparents must a fence*

'My grandparents must have a fence.' \*epistemic, ✓deontic, ✓teleological

I will argue that, despite appearances, Dutch does not falsify Rubinstein's generalization. In this chapter, I will claim that Dutch fits in with the claim that deontics have to combine with a verbal phrase, since underlyingly, the modal complement in (4) contains a verb (5) (cf. van Riemsdijk 2002, 2009, but see Barbiers 1995 for counterarguments). Following the result from chapter 2 (see also chapter 1, section 4), I claim that deontics combine with a complement that is slightly bigger than a vP, namely, an Aspectual Phrase (AspP). Crucially, the complement does not contain tense and is thus smaller than a Tense Phrase (TP).

- (5) [Mijn grootouders<sub>i</sub> moeten [<sub>AspP</sub> [<sub>vP</sub> een hek V]]]  
*my grandparents must a fence V*

My analysis in (5) has implications for the restriction on an epistemic modal flavor: If an underlying verb is present, which makes the complement highly similar to complements with an overt verb, why can the modal still not have an epistemic flavor, as shown in (1)? Previous analyses of the first restriction all focus on the absence of the verb in (5) (Barbiers 1995, Eide 2005, Constantinescu et al. 2012) and as such do not carry over. My explanation is that even though the complement is verbal, it is still too small for an epistemic flavor to arise: it is smaller than a TP, namely, an AspP (5). Since epistemics take a TP-complement, an AspP-complement is too small for an epistemic modal to arise (5), unlike the TP-complement that epistemic modals take with a verbal complement (6).

- (6) [Mijn grootouders<sub>i</sub> moeten [<sub>TP</sub> een hek hebben]]]  
*my grandparents must a fence have*

To summarize, my main claim of this chapter is that Dutch modals with non-verbal complements fit into the cross-linguistic generalizations linking modal flavor and complement size: deontics have to combine with an AspP, and while Dutch modals with non-verbal complements seem to go against this generalization, I claim that they adhere to it as underlyingly, these complements contain verbal structure. The restriction on an epistemic modal flavor can furthermore be explained if the

complement, though it contains a verb, is smaller than a TP since epistemic modals need to combine with a TP.

The organization of this chapter is as follows. In section 4.2., I will provide a brief introduction to modals with apparent non-verbal complements in Germanic languages and beyond. Then, I will delve into the (un)availability of a deontic flavor for these modals in section 4.4, and the unavailability of an epistemic flavor for these modals in section 4.5. The status of the covert verb in (5) will be discussed in section 4.6.

#### 4.2. Modals with non-verbal complements

##### 4.2.1. Non-verbal complements in Dutch

Dutch modals can combine with what appears to be non-verbal complements – they can take what look like an AP (7a), PP (7b), NP (7c), or CP-complement (7d). This is similar to modals in other Germanic languages, such as Afrikaans (8a), German (8b) or Norwegian (8c) (Barbiers 1995, van Riemsdijk 2002, Eide 2005, van Dooren 2014, 2017), though Eide (2005:27) notes that Dutch has a wider range of possibilities than Norwegian and German because of the availability of an AP-complement (see also van Dooren 2014).

- (7)      a. De muur mag **blauw**. AP  
              *the wall   may blue*  
              'The wall may become blue.'
- b. Jan kan **naar huis**. PP

*Jan can to house*

'John may go home.'

c. Marie moet **een koekje**.

NP

*Marie must a cookie*

'Marie must get a cookie.'

d. Het kan **dat je je even niet lekker voelt**.

CP

*it can that you you a.while not nice feel*

'It can happen that you don't feel well for a while.'

(8) a. Hierdie muur moet **blau**.

Afrikaans (van Dooren 2014)

*here.the wall must blue*

'The wall must become blue.'

b. Jan darf **nach Hause**.

German (van Dooren 2014)

*Jan may to house*

'John may go home.'

c. Jon må **på skolen**.

Norwegian (Eide 2005:27)

*Jon must to school*

'Jon must go to school.'

A second noticeable fact about this type of sentences is that at least in spoken Dutch, it is highly frequent: In a corpus study on child-directed speech, van Dooren et al. (2019) found that from the 15,185 modals uttered by 7 adults, 35% (n=5,343) does not contain an overt verb. While this corpus might be special in that it contains speech directed towards children (the Groningen corpus (Wijnen & Verrips 1998) on the

CHILDES database (MacWhinney 2000)), it gives a first indication of how frequent the use is.<sup>32</sup>

A third and final fact about modals with apparent non-verbal complements is the one central in this chapter, namely, that compared to modals with a verbal complement, the modal flavors that are available is limited. An epistemic flavor is unavailable with all but the CP-complements (9), which I will leave CP-complements out of the discussion for now - though see chapter 1 and chapter 5 for further details. The absence of epistemic flavor for the other complement types seems to be a cross-linguistically stable fact, as it has been confirmed for Norwegian (Eide 2005), German, Afrikaans, and Frisian (van Dooren 2014), as well as the non-Germanic languages Hebrew (see section 4.1.2, Rubinstein 2012), Russian, and Czech (Harves 2017). In (10), the data for Russian are given: While *musel* 'had to' combined with an overt verb can be used to express an epistemic modal flavor (9a), the same modal combines with what appears to be a PP-complement cannot (9b).

- (9) Mijn grootouders moeten een hek. Dutch  
*my grandparents must a fence*  
 i. #'My grandparents must have a fence (they're very private people).' \*epistemic  
 ii. 'My grandparents must have a fence (the mayor tells them to).' ✓deontic  
 iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).' ✓teleological
- (10) a. Pavel musel jet do Prahy. Russian (Harves 2017)  
*Pavel must.PST to-go to Prague*

---

<sup>32</sup> Note that only a subset of the modals was included in this study, namely, the four modals that can be used to express different flavors (*kunnen* 'can', *moeten* 'must', *hoeven* 'need' and *zullen* 'will').

- |   |            |
|---|------------|
| i. 'It must have been the case that Pavel went to Prague.'  | ✓epistemic |
| ii. 'Pavel was obliged to go to Prague.'                    | ✓deontic   |
| b. Pavel musel <b>do Prahy.</b>                             |            |
| <i>Pavel must.PST to Prague</i>                             |            |
| i. #'It must have been the case that Pavel went to Prague.' | *epistemic |
| ii. 'Pavel was obliged to go to Prague.'                    | ✓deontic   |

Previous explanations for the absence of epistemic flavor in Dutch depend on the analysis of sentences like (9). These analyses can be divided into two broad categories: Those that assume that the complement in (9) is truly non-verbal, as in (11) (Barbiers 1995, 2002, Eide 2005, Constantinescu et al. 2012) and those that assume that the non-verbal status is merely apparent since underlyingly, the complement contains an elided infinitive (12) (vanden Wyngaerd 1994, van Riemsdijk 2002, 2009, van Dooren 2017, cf. Marušič & Žaucer 2005 for Czech, Harves 2017 for Russian).

- |      |   |                     |
|------|---|---------------------|
| (11) | [Mijn grootouders <sub>t</sub> [ <sub>VP</sub> moeten [ <sub>NP</sub> <i>t</i> een hek]]]                             | non-verbal analysis |
|      | <i>my grandparents      must      a   fence</i>   |                     |
| (12) | [Mijn grootouders <sub>t</sub> [ <sub>VP</sub> moeten [ <sub>AspP</sub> [ <sub>VP</sub> <i>t</i> een hek   HEBBEN]]]] | verbal analysis     |
|      | <i>my grandparents      must      a   fence   HAVE</i>  |                     |

Before delving into the two competing analyses I will discuss a second restriction on modal flavor when the modal combines with a non-verbal complements: In a subset of the languages that can occur with non-verbal

complements, a *deontic* flavor is absent as well as an epistemic when the modal occurs without an overt verb in its complement.

#### 4.2.2. Non-verbal complements in Hebrew and English

Rubinstein (2012) claims that cross-linguistically, modals with non-verbal complements cannot be interpreted deontically. If Rubinstein is correct, there are languages in which modals with non-verbal complements are further restricted in the flavors that they can express: Not only are epistemic flavors unavailable (section 4.2.1.), but deontic flavors are too. Since Dutch seems to be a counterargument to this claim (section 4.1.), let us first look more closely at data supporting Rubinstein's proposal.

Rubinstein collected data from Hebrew, Hindi-Urdu, and English. The Hebrew modals *ḥayav* 'must' and *tsariḥ* 'need' can be used to express epistemic, deontic, and teleological flavors when they combine with an infinitive (13). Rubinstein shows that when the same modal combines with a nominal, only a teleological interpretation is available. She supports this claim by means of contexts that make a deontic interpretation *true* and a teleological interpretation *false*. In these contexts, sentences are judged *true* only if a deontic flavor is available. One of these contexts is in (14), repeated from (3): In this context, the deontic interpretation is true as the mayor *obliges* you and your neighbor to get a fence, while the teleological interpretation is false as you and your neighbor do not *need* a fence. Rubinstein (2012:163) judges (14a) as *true* in the context of (14), but (14b) as *false*, which she takes as evidence that a deontic flavor is unavailable for the Hebrew modals with an NP-complement.

- (13) tsrəχ-a/ χayev-et lihyot kan **gader**. (Rubinstein 2012: 164)

*need-F.SG/must-F.SG be.Inf here fence*

i. '(Given the results of a survey about fence locations in town) there must be a fence here.'

✓epistemic

ii. 'There must be a fence (the mayor tells us to).'

✓deontic

iii. 'There must be a fence (in order to keep the wild animals off our land).'

✓teleological

- (14) City regulations mandate that home owners put up fences between their properties.

You and your neighbor get along very well without a fence. In fact, both of you object to a fence because it would have to go right on top of the beautiful flower beds that have been flourishing between your two properties. You say to your neighbor:

a. tsariχ/ χayav-im livnot kan **gader**.

*need.M.SG/must-M.PL build.Inf here fence*

'A fence needs to be built here.'

b. tsariχ/ χayav-im kan **gader**.

*need.M.SG/must-M.PL here fence*

'We need a fence here.'

The second language I will discuss is English. Rubinstein claims that English *need* can have both deontic and teleological flavors when it combines with a verbal complement, but only a teleological flavor when it combines with an NP-complement.

English is an interesting case as in older stages of English, *most* ancestors of the modern modals were able to combine with non-verbal complements (15) (Visser



1963-1973, Lightfoot 1979, Roberts 1993, van Kemenade 1990, van Dooren 2014, a.o.). In Modern English, however, this phenomenon is more limited (16): The class of modal auxiliaries consisting out of *must*, *might*, *may*, *can*, *could*, *will* and *would*, cannot combine with NP-, PP-, or AP-complements.<sup>33</sup>

- (15) a. euerych bakere of þe town...shal to þe clerke of þe town **a penny** Old English

*every baker of the town...owes to the clerk of the town a penny*

'every baker of the town... owes a penny to the clerk of the town'

(a1400: Usages of Winchester, p.64; Visser 1963-1973, §549; in Roberts 1993:313)

- b. Binnan þrim nihtum cunne ic **his mihta**

*within three nights can-SBJ I his powers*

'may I know his powers within three nights'

(Metrical Charms, 9, 14 in Van Kemenade 1993:151)

- c. gif hi motan **to helle**.

*if they must to hell*

'if they must go to hell.'

(1150-1250; Morris 1969; Lambeth Homilies)

- (16) a. My grandparents must \*(have) **a fence**. NP

- b. The wall may \*(become) **blue**. AP

English *need*, however, can combine with apparent NP-complements (17a), and for some speakers also with PP-complements (17b), besides taking a verbal

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<sup>33</sup> While some verbs and modals in Pittsburgh English can combine with a participle (i), I argue elsewhere that this is a verbal as opposed to an adjectival participle, and as such are inside a vP (van Dooren 2016).

(i) a. Your radiator could **refurbished**.  
b. The car needs **washed**.

Tenny 1998:592

complement (18). While *need* differs from the modal auxiliaries in its morpho-syntactic properties as it is tensed and agrees with its subject, Rubinstein includes it in her study as it has the semantic versatility of a modal in the sense that it can be used to express at least a teleological and deontic modal flavor.<sup>34</sup>

- |      |   |                  |
|------|---|------------------|
| (17) | a. My grandparents need <b>a fence</b> .        | NP <sup>35</sup> |
|      | b. %The dog needs <b>out</b> .                  | PP               |
| (18) | a. My grandparents need to get <b>a fence</b> . | vP               |
|      | b. The dog needs to go <b>out</b> .             | vP               |

Rubinstein claims that *need* is restricted in the same way as Hebrew *ḥayav* ‘must’ and *tsariḥ* ‘need’: When *need* combines with a verbal complement, it can have both a deontic and a teleological flavor, but when it combines with an NP-complement, it can only have a teleological flavor. As the judgments are subtle, especially since it is always an option for your *goal* (teleological modality) to be to *obey the rules* (deontic modality), she supports this claim by means of a quantitative acceptability judgment study on naïve native speakers of English.

Rubinstein's trials in her experiment are as in (19), in which a context is followed by a sentence with *need* combining with either a verbal (19a) or a non-verbal complement (19b). The question asked after each sentence is "How well does the sentence fit with the story?" If the modal can have a deontic flavor, this sentence should fit in well (since the rules of the cake exchange are such that Sharon is

<sup>34</sup> She claims that epistemic uses seem rare and atypical, following Smith 2003 (Rubinstein 2012:139).

<sup>35</sup> Note that some researchers have claimed that this sentence is also underlyingly verbal (cf. Quine 1956, McCawley 1974, and Larson, Den Dikken and Ludlow 1997, Fodor & Lepore 1998, Harley 2004), which is further discussed below.

required to take the cake), but if the modal can only have a teleological flavor, the sentence might not fit so well. After all, Sharon should not get the coconut cake in order to reach any of her goals, as she does not like the flavor.

- (19) This weekend the local community center is organizing a cake exchange event. Everyone who comes brings a homemade cake and gets someone else's cake in return. The exchange is determined randomly in a drawing. When Sharon saw what she had just won she was very upset: it was the coconut cake – the flavor she hates most of all!

*a. Sharon needs to take **the coconut cake**.*

*b. Sharon needs **the coconut cake**.*

The experiment involved 40 naïve native speakers of English. The results show that there is a difference between the two, with the NP-condition in (20b) getting an average rating of 2.94 on a scale from 1 to 5, and the vP-condition in (20a) getting an average of 3.75. Rubinstein concludes from this that a deontic interpretation is not readily available for *need* with an NP-complement.

Rubinstein thus argues that *need* only has a teleological reading with an NP-complement, as a deontic flavor needs to have a verbal complement. However, many have in fact proposed that the complement of *need* in sentences like (19b) is not a mere NP but contains an unpronounced verb (20) (Quine 1956, McCawley 1974, Larson, Den Dikken and Ludlow 1997, Fodor & Lepore 1998, Harley 2004), similar to proposals for Dutch modals with non-verbal complements. If this is true for *need*, it would threaten Rubinstein's generalization, as a modal with a *verbal* complement

nonetheless does not have a deontic flavor. I will argue that while *need* with an NP-complement may contain a more complex syntax and semantics than is evident from the surface string (following Schwarz 2007), it does not contain underlying verbal structure and therefore, the unavailability of a deontic flavor is expected according to Rubinstein's generalization.

(20) Mary<sub>t</sub> needs [<sub>TP</sub> *t* TO HAVE a unicorn in the garden]

In the case of *need* with an NP, why have researchers hypothesized that there is more structure than meets the eye? *Need*, as part of the class of so-called *intensional transitive verbs* has received much attention in the literature as it seems to break the link between intensionality and clausal complements (Quine 1956, Montague 1973, Zimmermann 1992, Moltmann 1997). Typically, intensional operators combine with a proposition. A transitive verb like *need* however creates an intensional environment, which contrasts with non-intensional transitive verbs like *see*: In contrast to (22), a statement like (21) does not seem to force the speaker to be committed to the existence of unicorns.

(21) Mary needed a unicorn in the garden.

(22) Mary saw a unicorn in the garden.

The debate concerning intensional transitive verbs is split in two, as in the Dutch modal case: One side claims that *need* in sentences like (19) and (21) combines with a complement that is underlyingly verbal (Quine 1956, McCawley 1974, and

Larson, Den Dikken and Ludlow 1997, Fodor & Lepore 1998) with an elided infinitive *HAVE* (21) (or *GET*, Harley 2004), while others claim it combines with a non-clausal complement, thereby breaking the link between intensionality and clausal complements (Montague 1973, Zimmermann 1992, and Moltmann 1997). Schwarz (2007) argues for a mixed approach in which certain intensional transitive verbs take a Small Clause complement (23), while others take a true NP.

(23) Mary<sub>i</sub> needs [<sub>SC</sub> *t* HAVE a unicorn in the garden]

To summarize, I will argue that Rubinstein's generalization holds in both English and Dutch. I will first show that a covert verb analysis applies to *Dutch* non-verbal complements, which is why the modal has a deontic flavor available when it combines with an NP, PP or AP-complement. I will then argue that while English *need* with an NP-complement may underlyingly contain more structure than meets the eye, in the form of a Small Clause for instance (Schwarz 2007), it crucially does not contain a verb, which explains why the deontic flavor is absent.

#### 4.2.3. Intermediate summary

The data we have seen in the previous sections is summarized in Table 1. There are two main take-aways. First, in all languages we saw, there are modals that can be used to express both an epistemic and a root flavor when they combine with a verbal complement. Modals with non-verbal complements can in the same languages however only be used to express a root flavor (Table 1, empty cells). Second, there is a split between languages in which modals with non-verbal complements can be used

to express a deontic flavor, and languages in which they cannot: While English, Hebrew, and Hindi-Urdu modals with an NP-complement cannot be used to express a deontic flavor with this type of complement, Dutch modals with an NP-complement, as well as with an AP and PP-complement, can.

*Table 1: Summary of some of the data seen so far*

modal complement	epistemic	root	
		deontic	teleological
verbal	English, Dutch, Hebrew, Russian, a.o.		
AP, PP	*	Dutch, Afrikaans, Frisian, German, Norwegian, Russian, Czech <sup>36</sup>	
NP	*	Dutch	Dutch, English <i>need</i> , Hebrew, Hindi-Urdu

The data thus highlight cross-linguistic similarities as well as some apparent differences in the availability of modal flavors for a given structure. I will argue that despite surface differences, the same restrictions hold across these languages: epistemic flavors require a TP complement, and thus are unavailable with any type of non-verbal complement. Teleological flavors can combine with complements as small as an NP, which is why it is available with non-verbal complements. Deontic flavors require a verbal complement (following chapter 1, an Aspectual Phrase, to be precise), and should therefore be unavailable with non-verbal complements. Why

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<sup>36</sup> While modals with an AP and PP-complement are displayed as being able to express both a deontic and a teleological flavor, for languages besides Dutch this needs to be checked: Eide (2005), van Dooren (2014) and Harves (2016) do not make a distinction between these two modal flavors.

then are deontic flavors available in Dutch when the modal combines with what looks like an NP, PP, or AP? I will show that despite surface appearances, the complement is in fact verbal.

In the next section, I will provide support in favor of the claim that Dutch non-verbal complements are underlyingly verbal.

#### 4.3. A verbal analysis of Dutch modals with non-verbal complements

In this section I will argue that the non-verbal complements of Dutch modals as in (26) only appear to be non-verbal, as they underlyingly contain verbal structure (27). In section 4.5. I will delve into the details of the covert verb, one of the questions being whether we need to postulate three different verbs that are not pronounced for the three types of sentences in (27) (*HEBBEN* 'have', *WORDEN* 'become', and *GAAN* 'go') or not.

- (26) a. Mijn grootouders<sub>t</sub> moeten **een hek**.  
*my grandparents must a fence*
- b. De muur moet **blauw**.  
*the wall must blue*  
 'The wall must become blue.'
- c. Jan kan **naar huis**.  
*Jan can to house*  
 'John may go home.'
- (27) a. [Mijn grootouders<sub>t</sub> [<sub>VP</sub> moeten [<sub>AspP</sub> [<sub>VP</sub> *t een hek* *HEBBEN*]]]]  
*my grandparents must a fence HAVE*
- b. [De muur<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t blauw* *WORDEN*]]]]

*the wall      must      blue      BECOME*

c. [Jan<sub>t</sub> [VP kan [AspP [VP *t* naar huis GAAN]]]

*Jan      can      to house      GO*

Whether underlying verbal structure is present in the sentences in (26) is a matter of debate. Over the last 25 years, there have been researchers arguing both in favor (Vanden Wyngaerd 1994, van Riemsdijk 2002, 2009) and against (Barbiers 1995, 2002) a verbal analysis. Where does a hypothesis about underlying verbal material come from? In the case of modals with non-verbal complements, researchers often start out with the intuition that the meaning of modals with verbal and non-verbal complements is very similar (Vanden Wyngaerd 1994, cf. Fodor & Lepore 1988 for English *need*). And yet, as we saw in section 4.1., the possible interpretations differ depending on whether or not there is an overt verb present – only with an overt verb, an epistemic modal flavor is available.

In section 4.3.1. I will review previous arguments against a verbal analysis of the Dutch sentences in (26) and argue that they are inconclusive. In section 4.3.2., I will provide a syntactic argument supporting a verbal analysis for Dutch modals with NP AP and PP-complements. This leads me to conclude that Dutch modals with apparent non-verbal complements underlyingly take a verbal complement and therefore fit into the cross-linguistic generalizations linking modal flavor and complement size: The split observed between Dutch and Hebrew in section 4.1. is only apparent since in all languages discussed so far, a deontic flavor is only available if the modal combines with a verbal complement – whether the verb in the complement is *overt* or *covert*.



#### 4.3.1. Arguments in favor of a non-verbal analysis

In this section I will present Barbiers's (1995, 2002, 2005) arguments against a verbal analysis of the complements under discussion, as well as van Riemsdijk's responses (2002, 2009), and I will conclude that Barbiers's arguments are compatible with a verbal analysis.

Barbiers's non-verbal analysis of the complements of modals is that NP-complements as in (28a) are true NPs (28b), while PP and AP-complements are inside a single syntactic constituent with the subject, a Small Clause, since they express a predicative relation (Stowell 1981, 1983).

- (28) a. Mijn grootouders<sub>t</sub> moeten een hek.

*my grandparents must a fence*

- b. Mijn grootouders moeten [NP een hek]

*my grandparents must a fence*

- (29) a. Jan kan naar huis.

*Jan can to house*

- b. Jan<sub>t</sub> kan [SC *t* naar huis]

*Jan can to house*

##### 4.3.1.1. Argument 1 in favor of a non-verbal analysis: the IPP-effect

A first argument Barbiers (1995, 2002) puts forward in favor of a non-verbal analysis is the absence of the Infinitive pro Participio effect (IPP-effect) in the sentences under discussion. As laid out in chapter 2, the auxiliary encoding the perfect in Dutch

normally selects for the participle form of a verb (30a). If a modal is added to this sentence, as in (30b), the modal however does not appear as a participle but as an infinitive. This phenomenon is called the IPP-effect.

- (30) a. Marie zegt dat Jan het boek heeft {**gelezen**, \***lezen**}.
- Mary says that Jan the book has read.PTC read.INF*
- 'Mary says that John has been reading the book.'
- b. Marie zegt dat Jan het boek heeft {**moeten**, \***gemoeten**} lezen. IPP-effect
- Mary says that Jan the book has must.INF must.PTC to read*
- 'Mary says that John has had to read the book.'

In case of a modal with an apparent non-verbal complement, the IPP-effect is absent (31a). This is unexpected if there is an underlying verb present. What is more, Barbiers argues, the absence of the IPP-effect is not due to the verb being elided, as the IPP-effect is present in ellipsis contexts as in (31b).

- (31) a. Jan had dat best {\***kunnen**, **gekund**}. (Barbiers 2005b:10)
- Jan had that best could-INF/could-PTC*
- 'John would very well have been able to do that'
- b. Jan had de kamer {**mogen**, \***gemogen**} ~~opruimen~~ maar niet hoeven opruimen.
- John had the room may-INF/may-PCP clean but not need-INF clean*
- 'John was allowed to clean the room but he did not have to do it.'

This seems like a strong argument. An alternative analysis is however possible, since there are many different analyses of the IPP-effect, including where it applies (Koopman & Szabolcsi 2000, Wurmbrand 2001, 2004, Broekhuis & Corver 2015, a.o.; cf. chapter 2). If we follow Wurmbrand (2004) in her analysis of the IPP-effect as an effect that takes place only after the syntactic derivation proper is completed, the absence of the IPP-effect in sentences like (31a) can be explained under a verbal analysis of the complement (cf. Aelbrecht 2010 on Modal Complement Ellipsis, see below): Wurmbrand's analysis is that at the interface between syntax and phonology, called PF, modals followed by an infinitive are spelled out as infinitives rather than participles. If the IPP-effect is indeed not part of syntax proper but instead, of the interaction between syntax and phonology, the absence of the IPP-effect in (31a) tells us that at PF, there is no infinitive present in this type of sentences. It does not tell us whether the infinitive is present during the syntactic derivation, which therefore needs to be determined based on other arguments.

There are two possible analyses of sentences like (31a) in which the infinitive is absent at PF: The infinitive could be present during syntax proper, but deleted at PF (following Aelbrecht's (2010) work on Modal Complement Ellipsis), or the infinitive could be phonetically empty to begin with (van Riemsdijk 2002). I will discuss both options below.

Aelbrecht (2010) argues in favor of PF-deletion of infinitives for the phenomenon called Modal Complement Ellipsis (MCE). This phenomenon, which is highly related to modals with non-verbal complements, requires some introduction. In

Dutch, regular VP-ellipsis is not allowed (32b), but the complements of modals can be elided (33). Aelbrecht calls this phenomenon Modal Complement Ellipsis.

(32) a. Monika has paid already, but Alice hasn't. (Aelbrecht 2010:14)

b. \* Jelle heeft al betaald, maar Johan heeft nog niet.

*Jelle has already paid but Johan has still not*

(33) a. Jan mag wel betalen maar hij hoeft niet.

*Jan may PRT pay but he needs not*

'John may pay but he doesn't have to.'

b. Jan moet niet betalen maar Marie moet wel.

*Jan must not pay but Mary must PRT*

'John must not pay but Mary needs to.'

Aelbrecht presents sentences like (33) as support for a theory in which ellipsis is licensed by particular heads; this explains why Dutch modals<sup>37</sup>, but not auxiliaries such as *hebben* 'have' (32b) can license ellipsis. She moreover argues that MCE has underlying syntactic structure present: Sentences like (34a) should be analyzed as (34b) in that there is syntactic structure in the ellipsis site. If there would not be underlying structure present and the structure would be exactly like the surface string in (34a), it remains unexplained why extraction of the subject *hij* 'he' is possible in

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<sup>37</sup> In particular, *root* modals: an epistemic interpretation of the modal is unavailable in MCE (i). While Aelbrecht (2010) assumes an identical structure for root and epistemic modals (cf. chapter 2), I argue that the type of complements that modals combine with differs: a TP for epistemics, and a vP for deontics. My suggestion is that instead of building this restriction into the analysis (Aelbrecht 2010:126), the infelicity of (i) could thus be located in the type of complement involved in MCE.

(i) \*Klaas zegt dat hij al klaar is met zijn huiswerk, maar hij **kan** toch niet? (Aelbrecht 2010: 49)  
*Klaas says that he already ready is with his homework, but he can PRT not*  
 Intended: 'Klaas says's he's already done his homework, but he can't be.'

passive sentences, since it originates as the internal argument of the verb *wassen* 'wash'.

- (34) a. Die broek mag gewassen worden, maar hij moet niet.  
*those pants may washed become but he must not*  
 'Those pants can be washed, but they don't have to be.'
- b. Die broek mag gewassen worden, maar hij<sub>t</sub> moet niet [~~gewassen worden~~ *t*].  
*those pants may washed become but he must not washed become*  
 'Those pants can be washed, but they don't have to be.'

With this much background, it is interesting to see that the IPP-effect is absent in the case of MCE as well (Aelbrecht 2010:144). Since Aelbrecht claims there is underlying structure present, why does the modal in (35) show up as a participle and not as an infinitive?<sup>38</sup>

- (35) Ralf wou niet werken, maar hij heeft {**gemoeten**, \***moeten**}. Aelbrecht (2010:144)  
*Ralf wanted not work but he has must.PTC must.INF*  
 'Ralf didn't want to work, but he had to.'

Aelbrecht follows Wurmbrand (2004) and claims that the ellipsis in (34) and (35) has been completed before PF. As such, the structure of the sentence in (35) is

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<sup>38</sup> What remains unexplained is the difference between (31b) and (34b). This question about the conditions under which ellipsis does and does not lead to the IPP-effect is outside the scope of this thesis.

exactly like the surface string and does not contain an infinitive in its complement anymore. Therefore, the IPP-effect does not take place.

While the above analysis brings MCE and modals with non-verbal complements together, van Riemsdijk (2002:163) argues that in the case of modals with non-verbal complements, an alternative is available. He claims that it is not necessary to posit PF-deletion and instead, the Dutch lexicon might contain a number of infinitives that have no phonetic content. Under this analysis, too, no infinitive is present and as such, the IPP-effect does not take place.

Since I have no way to distinguish between PF-deletion of the infinitive versus the presence of infinitives that lack phonetic content, I will not decide between the two options. Under both analyses, even when there is underlying verbal structure present before PF, it is not present at PF, which explains the lack of the IPP-effect.

#### *4.3.1.2. Argument 2 in favor of a non-verbal analysis: the semantic restriction*

Barbiers's second argument concerns the absence of an epistemic flavor for modals combining with an NP-, PP-, or AP-complement. He claims that if the deletion of the infinitive occurs at PF, as described in the previous section, this should not have any consequences for the available interpretations (Barbiers 2002:54). And yet, an epistemic flavor is unavailable (36), repeated from (4) above.<sup>39</sup>

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<sup>39</sup> Van Riemsdijk (2002) claims that at least one Dutch modal can have an epistemic flavor in combination with a non-verbal complement (i). I argue elsewhere that this is an evidential, rather than an epistemic use of the modal (van Dooren 2014).

(i) Jij zou toch naar Antwerpen? (Van Riemsdijk 2002:166)  
you would part to Antwerp?  
'Weren't you supposed to have gone to Antwerp?'

- (36) Mijn grootouders moeten een hek. Dutch  
*my grandparents must a fence*
- i. #My grandparents must have a fence (they're very private people).' \*epistemic
- ii. 'My grandparents must have a fence (the mayor obliges them to).' ✓deontic
- iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).'
- ✓ teleological

In what follows I will propose a competing analysis for why an epistemic flavor is unavailable that does not rely on PF-deletion. In section 4.5. I claim that the epistemic flavor is unavailable to begin with, as epistemics need to combine with a complement bigger than the complement in (36).

#### 4.3.1.3. Argument 3 in favor of a non-verbal analysis: a selectional restriction

Barbiers's third argument concerns a purported selectional restriction on the complement: He states that only predicates that have a value on a bounded scale can be the non-verbal complement of a modal (Barbiers 1995, 2002). So, while *leeg* 'empty', *open* 'open' and *uit* 'off' all denote values on scales with closed bounds (empty-full, open-closed, off-on) and as such are felicitous in the complement of a modal, predicates like *ziek* 'sick', *intelligent* 'intelligent' and *lang* 'long' denote values on scales with open bounds and correspondingly, are infelicitous in the complement of a modal (37).

- (37) a. De fles moet **leeg**. (Barbiers 2002:56)  
*the bottle must empty*

b. Het raam kan **open**.

*the window can open*

c. Het licht mag **uit**.

*the light may off*

d. \*Het konijn kan **ziek**.

*the rabbit can sick*

e. \*Jan moet **intelligent**.

*Jan must intelligent*

f. \*De speler moet **lang**.

*the player must long*

My explanation of the unacceptability of (37d-f) is however that they are instantiations of a common restriction on non-epistemic modals and that this restriction is not specific to modals with non-verbal complements (van Dooren 2014). With an overt verb present, the sentences in (37d-f) indeed improve (38), but that is because an epistemic interpretation becomes available.

(38) a. Het konijn kan **ziek** zijn. epistemic, ?deontic

*the rabbit can sick be*

b. Jan moet **intelligent** zijn. epistemic, ?deontic

*Jan must intelligent be*

c. De speler moet **lang** zijn. epistemic, ?deontic

*the player must long be*



A non-epistemic interpretation is unavailable in both (37) and (38) because of a semantic incompatibility between the modal flavor and the types of predicates: Deontic modals, for instance, are used to express obligations. It does not make sense to give an obligation to become *sick*, *intelligent*, or *tall* as the obligee does not have control over these properties (Ninan 2007, see also Farkas's 1988 notion of *responsibility*, or Condoravdi 2002 on the future-orientedness of non-epistemic modals – if non-epistemic modals tend to combine with events that have yet to unfold, it explains why they are incompatible with stative predicates like *sick*, *intelligent*, or *tall*). Deontic modals behave like imperatives in this way – they cannot combine with the predicates in (37d-f) either:

- (39) a. #Wees ziek!  
           *be sick*  
       b. #Wees intelligent!  
           *be intelligent*  
       c. #Wees lang!  
           *be tall*

Further support for the claim that the unacceptability of (37d-f) is not due to a selectional restriction imposed by the modal is that the context can be changed in such a way such that predicates without closed bounds become acceptable: In the context of making a drawing, predicates like *groot* 'big', *klein* 'small', *dik* 'fat' and *dun* 'skinny' can all combine with a modal with no overt verb present (40).

- (40) (in a drawing:) De olifant moet **groot/klein/dik/dun** (zijn). deontic

*the elephant must big small fat thin be*

‘The elephant must be big/small/fat/thin.’

#### 4.3.1.4. Argument 4 in favor of a non-verbal analysis: recoverability

Barbiers's (1995) final arguments concern the status of a potential covert verb. If there are covert verbs like *HEBBEN* 'have', *WORDEN* 'become', and *GAAN* 'go', as I claim in (41) (repeated from (36)), why can these verbs not freely be added or deleted in every Dutch sentence? To give one example, why can *gaan* 'go' not be deleted in (42), since it apparently can be deleted in (41c)?

- (41) a. [Mijn grootouders<sub>t</sub> [<sub>VP</sub> moeten [<sub>AspP</sub> [<sub>VP</sub> *t* een hek *HEBBEN*]]]

*my grandparents must a fence HAVE*

- b. [De muur<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* blauw *WORDEN*]]]

*the wall must blue BECOME*

- c. [Jan<sub>t</sub> [<sub>VP</sub> kan [<sub>AspP</sub> [<sub>VP</sub> *t* naar huis *GAAN*]]]

*Jan can to house GO*

- (42) Deze maatregel moet vandaag in \*(gaan).

*This measure must today in go*

‘This measure must be effective as from today.’ (Barbiers 1995:153)

These are fair questions that need to be answered in a full account of the covert verbs. While I will not be able to do so in this chapter, I will go into further detail

about the nature of the covert verbs in section 4.5. As it turns out, Barbiers's questions issues raised help to narrow down the interpretation of the verbs posited in (41).

#### 4.3.1.5 Intermediate summary

In the previous sections, I have presented Barbiers's arguments in favor of a non-verbal analysis of complements in sentences like (43), and claimed that these arguments are compatible with a verbal analysis as long as the infinitive is not present at PF.

- (43) a. Mijn grootouders<sub>i</sub> moeten **een hek**.  
*my grandparents must a fence*
- b. De muur moet **blauw**.  
*the wall must blue*  
'The wall must become blue.'
- c. Jan kan **naar huis**.  
*Jan can to house*  
'John may go home.'

In what follows, I will further defend a verbal analysis of modals with apparent non-verbal complements, thereby following van Riemsdijk (2002, 2009), by presenting a largely novel argument concerning the availability of manner adverbs. This argument, I claim, shows that the complements in (43) are in fact at least the size of a vP. In the end, this will help us solve the puzzle this chapter started out with: While Dutch seemed to be a counterexample to the claim that deontic modals need a

verbal complement, it in fact is in line with it – there is verbal material in the complements in (43), although it is merely covert.

#### 4.3.2. An argument in favor of a verbal analysis: Manner adverbs

Manner adverbs like *carefully*, *quickly* and *gradually* tell us *how* something happened. These adverbs need to be licensed by verbal structure<sup>40</sup>: They cannot modify an NP, as the adverb *carefully* in (44b) and (45b) modifies the event rather than the NP *the dog* – neither sentence can express that *the dog* is careful, for instance.

(44) a. Mary walks carefully.

b. Mary walks the dog carefully.

(45) a. Marie traint voorzichtig.

*Mary trains carefully*

'Mary trains carefully.'

b. Marie traint de hond voorzichtig.

*Mary trains the dog carefully*

'Marie trains the dog carefully.'

There moreover seems to be a restriction on manner adverbs in sentences containing resultatives, which are generally assumed to be in a non-verbal, Small Clause structure (Hoekstra 1988, Bowers 1997, Ramchand 2008, etc.). My argument

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<sup>40</sup> A further condition that needs to be satisfied for the felicitous attachment of manner adverbs is that the verbal structure is eventive as opposed to stative (Katz 2000, Maienborn 2005).

(iv) #John quickly/carefully resembles Mary.

is based on the sentences in (46)-(47): If Small Clauses are able to be modified by manner adverbs by themselves, we would expect these sentences to be able to be modified by two clashing adverbs: One modifying the verb, and one modifying the Small Clause. While the sentences in (46a)-(47a) can be modified by one manner adverb, *quickly*, it is infelicitous to add a second manner adverb *slowly*. The reason for the infelicity does not seem to be that the thought is somehow inconsistent, as one can imagine a situation in which Al pounded the cutlet *quickly* with the result that the cutlet flattened *slowly* over time (Williams 2015). Williams (2015:200) argues that the fact that the manner adverb *quickly* in (46) cannot describe the means event (the *pounding*), shows that the adverb cannot combine with the verb *pound* alone, to the exclusion of the structure that also contains *flat*. To me, sentence (46) moreover shows that the problem is that there is only one attachment site for manner adverbs in this sentence: I see this as a side-effect of the reduced syntactic structure in Small Clauses (Stowell 1981, Moro 2008, a.o.) and take it to mean that the only attachment site for manner adverbs includes both the verb and the Small Clause. See Rappaport Hovav and Levin 2001, Williams 2015 for further details on adverbs and Small Clauses.

- (46) a. Al quickly pounded the cutlet flat (#slowly). (Williams 2015:199)

Intended: 'Al quickly pounded the cutlet so that it became flat slowly.'

- b. Al quickly pounded [<sub>SC</sub> the cutlet flat.]

- (47) a. Hij sloeg snel de hamburger (#langzaam) plat.

*he hit quickly the hamburger slowly flat*

- b. Hij sloeg snel [<sub>SC</sub> de hamburger plat.]

Manner adverbs are however felicitous in Dutch sentences in which modals combine with apparent non-verbal complements (48)-(49). In that case, the adverbs modify the complement and not the modal: Sentence (48a), for instance, does not mean that the obligation is careful; instead, it is the *washing* that is obliged to be *done carefully*. The same holds for the other NPs in (48) and the PPs and APs in (49). What is more, all these sentences are felicitous with an overt verb too (50).

- |      |    |   |    |
|------|----|---|----|
| (48) | a. | De auto moet ( <b>voorzichtig</b> ) een wasbeurt.   | NP |
|      |    | <i>the car must carefully a washing</i>             |    |
|      |    | 'The car must be washed carefully.'                 |    |
|      | b. | De patiënt mag ( <b>geleidelijk</b> ) vast voedsel. |    |
|      |    | <i>the patient may gradually solid food</i>         |    |
|      |    | 'The patient may gradually get solid food.'         |    |
|      | c. | De kat moet ( <b>snel</b> ) een prikje.             |    |
|      |    | <i>the cat must quickly a shot</i>                  |    |
|      |    | 'The cat must get a shot quickly.'                  |    |
| (49) | a. | De kinderen mogen ( <b>rustig</b> ) naar huis.      | PP |
|      |    | <i>the children may calmly to house</i>             |    |
|      |    | 'The children may calmly go home.'                  |    |
|      | b. | De hardlopers moeten ( <b>snel</b> ) het meer rond. | PP |
|      |    | <i>the runners must quickly the lake around</i>     |    |
|      |    | 'The runners need to go around the lake quickly.'   |    |
|      | c. | De kamer mag ( <b>geleidelijk</b> ) geel.           | AP |
|      |    | <i>the room may gradually yellow</i>                |    |

'The room may become yellow gradually.'

- d. De kamer moet (**langzaam**) leger. AP

*the room must slowly emptier*

'The room must become emptier in a slowly manner.'

- (50) a. De auto moet voorzichtig een wasbeurt **krijgen**.

*the car must carefully a washing get*

- b. De patiënt mag geleidelijk vast voedsel **krijgen**.

*the patient may gradually solid food get*

- c. De kat moet snel een prikje **krijgen**.

*the cat must quickly a shot get*

- d. De kinderen mogen rustig naar huis **gaan**.

*the children may calmly to house go*

- e. De hardlopers moeten snel het meer rond **gaan**.

*the runners must quickly the lake around go*

- f. De kamer mag geleidelijk geel **worden**.

*the room may gradually yellow become*

- g. De kamer moet langzaam leger **worden**.

*the room must slowly emptier become*

In order for the manner adverbs in (48)-(49) to have an attachment site, verbal structure needs to be present in the complement. I therefore follow Van Riemsdijk (2002, 2009) and posit a verb that does not get pronounced, a covert verb, in the complement of Dutch sentences, which makes the minimal size of the complement a vP (51). In chapter 1 and 2 I argued that the complement is a little bigger than a vP, namely, an Aspectual Phrase (AspP), which, crucially, does not contain tense.

- (51) a. [De auto<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* voorzichtig een wasbeurt HEBBEN]]]  
*the car must carefully a washing HAVE*
- b. [De kamer<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* langzaam leeg WORDEN]]]  
*the room must slowly empty BECOME*

Barbiers (2002:54) claims that 'agent-oriented adverbs' such as *zorgvuldig* 'carefully' are not felicitous when there is no overt verb (52). While this adverb also needs to be licensed by verbal structure, and the infelicity of (52) is therefore a potential counterargument against the analysis in (51), I argue that the sentence in (52) is infelicitous for a different reason: There seems to be a clash between the colloquial nature of modals with non-verbal complements, and the relatively formal adverb *zorgvuldig* 'carefully'. The more informal adverb *voorzichtig* 'carefully', which is very close in meaning to *zorgvuldig*, combines with modals with non-verbal complements in natural speech (53). Further support for the informality of modals with non-verbal complements comes from the fact that most examples in (53) are from forums and other social media, as opposed to more formal written language sources.

- (52) Die lampen moeten zorgvuldig uit \*(worden gedaan).

*these lights must carefully off (become done)*

'These lights must be switched off carefully.'

- (53) a. De achterkant (spaanplaat) **moet voorzichtig uit** en in elkaar of een nieuwe  
*the back.side chipboard must carefully out and in each.other or a new*



plaat kan ook geen kwaad.

*board can also no evil*

'The back side must be carefully taken apart and back together or a new board

won't hurt either.' (<https://www.marktplaats.nl/a/huis-en-inrichting/kasten-kledingkasten/m1572058163-brimnes-kledingkast.html>)

- b. Als je de rand eraf haalt, die zit met klemmetjes vast, wordt het al

*if you the edge there.of take that sits with clips fixed becomes it already*

duidelijker maar alles **kan voorzichtig uit elkaar** en dan wijst het

*clearer but everything can carefully out each.other and then points it*

zichzelf.

*itself*

'When you take of the edge, which is fastened with clips, it will become clearer

already but everything can be carefully taken apart and then it will become fully

clear.' (<https://www.camperforum.nl/viewtopic.php?t=8456602>)

- c. De temperatuur van het water schommelt tussen 30 à 40 graden. De servet **mag**

*the temperature of the water swings between 30 and 40 degrees the napkin may*

**voorzichtig in** het gebufferde water.

*carefully in the buffered water*

'The temperature of the water fluctuates between 30 and 40 degrees. The napkin

may carefully be put in the buffered water.'

([https://www.youtube.com/watch?v=Y\\_12y6lyx88](https://www.youtube.com/watch?v=Y_12y6lyx88))

- d. Het totale verbod op eten en drinken is hopelijk voorbij. Ze **mag voorzichtig**

*the total ban on eating and drinking is hopefully over she may carefully*

**wat vla** en wat drinken met een smaakje.

*some custard and some drink with a flavor*

'The total ban on eating and drinking is hopefully over. She may carefully get some custard and something to drink with a flavor.'

(<https://margagvz.wordpress.com/2016/07/11/marga-dag-6/comment-page-1/>)

Barbiers's alternative analyses for modals with non-verbal complements, which are laid out in section 4.3.1., are incompatible with the availability of manner adverbs: His analysis for Dutch modals that combine with an NP-complement is that they directly take an NP (54b), but as we saw above, manner adverbs cannot modify an NP (44).

- (54) a. Marie moet **een koekje**. NP  
*Marie must a cookie*  
'Marie must get a cookie.'
- b. [Marie [<sub>VP</sub> moet [<sub>NP</sub> een koekje]]

Barbiers's analysis for Dutch modals that combine with an AP or PP-complement is that they take a Small Clause complement (55b), which expresses the predicative relation between the subject and its predicate in a single constituent (55b). I argued that Small Clauses, however, are incompatible with manner adverbs too (46)-(47).

- (55) a. Jan moet **naar huis**. PP  
*Jan must to house*  
'John must go home.'

- b. [Jan<sub>t</sub> [<sub>VP</sub> moet [<sub>SC</sub> *t* naar huis]]]

To conclude, the possibility of having a manner adverb modifying the modal complement can be used as a diagnostic for underlying verbal structure in the complement.<sup>41</sup> What is more, this argument can be applied to other languages in the future, as it is not bound to a particular language; previous arguments in favor of a verbal analysis are mainly language-specific (van Riemsdijk 2002, 2009 on Swiss-German, Afrikaans, Alsatian, Luxembourgish, and West-Flemish<sup>42</sup>; van Dooren (2014) for an argument on Norwegian, using Eide's (2005:29) data involving *do*-replacement).

#### 4.3.3. Solving the Dutch puzzle: Deontics take a verbal complement

The diagnostic of manner adverbs supports the claim that Dutch modals with apparent non-verbal complements are in fact verbal. Since the complement in sentences like (56a) can be modified by an adverb like *voorzichtig* 'carefully', I claim that the structure at LF is as in (56b), with the modal combining with minimally a vP-complement, and in fact, an AspP (chapter 1 and 2). The verb *HEBBEN* 'have' does not get pronounced, however (either because of PF-deletion or because of a lack of phonetic content), which explains why the IPP-effect does not occur (section 4.2.1.1).

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<sup>41</sup> An interesting further prediction of a covert verb analysis concerns coordination: Since I claim that there are covert verbs in each of the coordinated phrases, we expect manner adverbs that clash in meaning to be felicitous; this is correct (i). Thanks to Alexander Williams for pointing this out.

(i) Jan moet **snel** naar het ziekenhuis en **langzaam** wat water.  
*Jan must quickly to the hospital and slowly some water*  
 'John must go to the hospital quickly and slowly get some water.'

<sup>42</sup> Van Riemsdijk (2002:180) provides further arguments on Dutch as well, but I argue elsewhere (van Dooren 2014) that these arguments are compatible with both a verbal and a Small Clause analysis.

- (56) a. De auto moet (**voorzichtig**) een wasbeurt.                      ✓deontic, ✓teleological  
           *the car must    carefully    a    washing*  
           'The car must be washed carefully.'
- b. [De auto [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> voorzichtig een wasbeurt    HEBBEN]]]  
           *the car        must                carefully    a    washing    HAVE*

The presence of verbal structure correlates with the availability of a deontic flavor for the modal in (56a), as discussed in section 4.1. Therefore, while on the surface, (56a) goes against Rubinstein's generalization (2012), which states that modals can only have a deontic flavor available if the complement is verbal, it in fact adheres to it: Underlyingly, the sentence in (56a) is structured as (56b) and therefore, at this level, the complement contains verbal structure. The claim that deontics need a complement containing verbal structure is upheld.

#### 4.4. Manner adverbs confirm Rubinstein's generalization

In this section, I will use the diagnostic developed in section 4.3. to confirm that Rubinstein's (2012) generalization holds cross-linguistically. In the previous section we saw that Dutch modals with non-verbal complements can license manner adverbs, which supports the claim that they are underlyingly verbal. Correspondingly, a deontic flavor is available for the modal. In this section I will apply the diagnostic to Hebrew and English modals with non-verbal complements, which confirm that the non-verbal complements in these languages are underlyingly non-verbal too, which corresponds with the absence of a deontic flavor for the modal (section 4.1.).

#### 4.4.1. No verbal structure in Hebrew

The diagnostic of manner adverbs provides further support for the connection between verbal complements and the availability of deontic flavor. Manner adverbs in Hebrew are licensed by verbal structure (57a). These adverbs are not allowed in the complement of the modal *χayav* combining with an NP-complement (57b). This shows that the complement does not contain verbal structure. Correspondingly, Hebrew *χayav* with an NP-complement can have a teleological, but not a deontic interpretation (Rubinstein 2012, section 4.1.).<sup>43</sup>

- (57) a. *χayav-im lishtof et ha-mexonit be-zehirut.*  
*must-M.PL to.wash ACC the-car in-care*  
 ‘We must wash the car carefully.’
- b. *ha-mexonit χayev-et shtifa (\*be-zehirut).* \*deontic, ✓teleological  
*the-car must-F.SG wash in-care*  
 (intended: ‘The car needs carefully a cleaning.’)

#### 4.4.2. No verbal structure in English

Schwarz (2007) observes that sentences in which *need* combines with a verbal complement are different from sentences in which *need* combines with an NP-complement in a number of ways. One of the differences is that the adverb *finally* cannot appear in the same position in sentences like (58b) as compared to sentences like (58a). Adverbs like *finally* and *carefully* (59) cannot modify the non-verbal

<sup>43</sup> The same judgments have been given for Hindi-Urdu (Vishal Arvindam, p.c.).

complement, which shows that there is no underlying verbal structure present. Since there is no verbal structure present, it is predicted by Rubinstein's generalization that a deontic flavor for *need* is unavailable when it combines with an NP-complement. This prediction was confirmed by Rubinstein's (2012) experiment, described in section 4.1., which shows that sentence (60) is infelicitous following the context that sets up for a deontic interpretation of the modal (Rubinstein 2012, section 4.1.).

- (58) a. I need to finally have a laptop (that works reliably every time I use it).  
(Schwarz 2007)

b. \*I need finally a laptop.

- (59) a. John needs a shot done carefully. (Phoebe Gaston, p.c.)

b. #John carefully needs a shot.

Intended meaning: John needs a shot done carefully.'

- (60) This weekend the local community center is organizing a cake exchange event. Everyone who comes brings a homemade cake and gets someone else's cake in return. The exchange is determined randomly in a drawing. When Sharon saw what she had just won she was very upset: it was the coconut cake – the flavor she hates most of all!

#Sharon needs the coconut cake. \*deontic, ✓teleological

While I will have to leave a discussion of other arguments put forward in favor of a verbal analysis of *need* with an NP-complement for future research, for now I thus side with researchers who claim that the complement does not underlyingly contain verbal structure (Montague 1973, Zimmermann 1992, and

Moltmann 1997, but also Schwarz 2007, see section 4.1.). While the complement may be syntactically more complex than a bare NP (it may for instance involve a Small Clause, as argued for by Schwarz (2007)), my claim is that it does not contain *verbal* material. If it did, the infelicity of (58b) and (59b) would remain unexplained.

#### 4.4.3. Summary

In this section I have argued that the NP-complements of Hebrew and English modals are truly non-verbal and consequently, the modal cannot have a deontic flavor (the same holds for Hindi-Urdu modals, see fn.39). As such, the split between languages in which modals can and cannot get a deontic flavor when they combine with non-verbal complements, which is the puzzle this chapter started out with, is merely superficial: Dutch, English, and Hebrew fit in a uniform pattern, in which the availability of a deontic flavor correlates with the presence of verbal structure in its complement. Rubinstein's generalization holds for all three languages, I claim, and I add that the verbal material can be covert (61b).

- (61) a. De auto moet (**voorzichtig**) een wasbeurt.                      ✓deontic, ✓teleological  
           *the car must carefully a washing*  
           'The car must be washed carefully.'
- b. [De auto<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* voorzichtig een wasbeurt HEBBEN]]]  
           *the car must carefully a washing HAVE*

Two questions remain. The first question will remain unanswered, and has not been answered by Rubinstein (2012) either: *Why* does the restriction on deontics hold? What makes the difference between a deontic and a teleological flavor, such that the former needs a verbal complement, but the latter does not? Elsewhere I have claimed that this might be a more general constraint that applies outside of the core modals (van Dooren 2017): Dutch *hebben* 'have' and *zien* 'see', for instance, can only have a deontic flavor when combined with an infinitival complement ((62)-(63)).

- (62) a. Je hebt te beginnen.  
           *you have to begin*  
           ‘You need to start.’
- b. Je hebt een begin.  
           *you have a start*  
           ‘You have a start.’
- (63) a. Je ziet je maar te redden.  
           *you see you but to rescue*  
           ‘You have to make it on your own.’
- b. Je ziet een redding.  
           *you see a rescue*  
           ‘You see a rescue.’

The second question, which is the topic of the next section, is why an epistemic flavor is unavailable for Dutch modals in sentences like (61a). If the underlying structure of sentences like (61a) is like (61b), the structure seems very



similar to those sentences in which an overt verb is present in the modal's complement. And yet, an epistemic flavor is only available when the verb is overt (section 4.1.). In the next section, I will claim that there is a small but crucial difference between Dutch modals combining with a covert and an overt verb, which correlates with the availability of an epistemic modal flavor.

#### 4.5. Epistemic modals & TP complements

In the previous section I claimed that Dutch modals with non-verbal complements are only apparently non-verbal: Underlyingly, sentences like (64a) are structured as in (64b) with a covert verb *HEBBEN* 'have'. And yet, the modal in sentences like (61a) does not have the same flavors available as modals combining with a complement in which the verb is overt (65): An epistemic flavor for modals in sentences like (64a) is unavailable (cf. section 4.1.). Where does this restriction on modal flavor come from?

(64) a. Mijn grootouders moeten **een hek**. Dutch

*my grandparents must a fence*

i. #'My grandparents must have a fence (they're very private people).' \*epistemic

ii. 'My grandparents must have a fence (the mayor tells them to).' ✓deontic

iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).'

✓teleological

b. Mijn grootouders moeten **een hek HEBBEN**.

*my grandparents must a fence have*

(65) Mijn grootouders moeten **een hek hebben**. Dutch

*my grandparents must a fence have*

i. 'My grandparents must have a fence (they're very private people).' ✓epistemic

- ii. 'My grandparents must have a fence (the mayor tells them to).' ✓ deontic
- iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).' ✓ teleological

All previous explanations of this restriction assume a non-verbal analysis for the sentences in (64) and tie the absence of the epistemic flavor to the absence of the verb (Barbiers 1995, Eide 2005, Constantinescu et al. 2012). This makes them incompatible with my analysis. In section 4.5.1. I will briefly discuss these proposals, after which I present my explanation based on a verbal analysis of the sentences in (64). I claim that the unavailability of an epistemic flavor in (64a) is because the complement, while being verbal, is still too small for an epistemic flavor to arise. Epistemic modals need a TP-complement, as I have argued in chapter 1 and 2; therefore, the unavailability of an epistemic flavor in (64a) follows if the complement is smaller than a TP – such as a vP or even an AspP, as I claimed in chapter 1.

#### 4.5.1. The absence of the epistemic flavor under a non-verbal analysis

The three previous accounts of the absence of epistemic flavor in sentences in which a modal combines with a non-verbal complement tie the restriction to the absence of a verb. Since I claim that there is verbal structure in the complement of the modal, the previous accounts are incompatible with my analysis presented in this chapter. They however provide us with insights on what might be necessary in a modal complement for an epistemic flavor to arise. Eide's (2004) proposal in particular is very close to the explanation I will argue for in section 4.4.2.

Barbiers (1995, 2002) ties the absence of an epistemic flavor to a semantic difference between verbs on the one hand, and PPs and APs on the other hand. Only verbs, he claims, denote events and therefore, only they can be the complement of an epistemic within the syntactic-semantic structures he argues for.

Barbiers posits different syntactic structures for roots and epistemics, which revolve around the position of a specific head,  $D_v$ .  $D_v$  is the highest head of a verbal complement and defines the relationship between the subject and the event. A modal that is in a position below the functional head gets a root interpretation and can have either a verbal or a non-verbal complement. A modal that is in a position above this head gets an epistemic interpretation and is restricted in the type of complement it can take: While D can define a relationship between a subject and an event (66a), it cannot do so with a PP or AP predicate (66b) because "the subject is not the source of the denoted property or direction. The property or direction exists independently of the subject and is attributed to the subject." (Barbiers 1995:207). Barbiers's explanation does not carry over to my analysis of modals with non-verbal complements as for me, there is an underlying verb present. What is moreover unclear to me is how a directional like *naar huis* 'to home' is less dependent on the subject than an event like *work*.

(66) a. [ $\text{Jan}_t$  moet [ $D$  [ $vP$   $t$  werken]]

*Jan must work*

b. \* [ $\text{Jan}_t$  moet [ $D$  [ $SC$   $t$  naar huis]]

*Jan must to house*

Constantinescu et al. (2012) follow a small clause analysis of modals with non-verbal complements, shown in (67b) for a sentence like (67a), and state that the combination of epistemic *moeten* with a small clause is pragmatically infelicitous because of a vacuous use of the modal: they argue that universal epistemic modals add the idea of there not being any exceptions to the prejacent, and as such, a non-vacuous use of epistemic *must/moeten* only occurs if the provided information in the prejacent is inconclusive. Small clauses, they claim, carry objective, conclusive evidence, in contrast to full verbal complements, which can be subjective (Guentchéva 1996). As such, an epistemic interpretation of *must/moeten* is infelicitous when it combines with a small clause.

(67) a. De melk moet in de ijskast.

*the milk must in the fridge*

'The milk needs to go in the fridge.'

b. De melk<sub>t</sub> moet [<sub>sc</sub> *t* in de ijskast]

*the milk must in the fridge*

Compare (68) in context (68a) and context (68b): Only in context (68b), the use of *must* is felicitous as the use is non-vacuous – while in context (68a), the evidence is conclusive and John could have said "It is raining", the evidence is inconclusive in (68b) since Mary could have been washing the umbrella.

(68) John says: It **must** be raining.

a. John looks outside and sees that it is raining.

b. John sees Mary walk in carrying a wet umbrella.

Small clauses, they claim, carry objective, conclusive evidence and as such are incompatible with epistemic *moeten*. Similar to (68a), they claim (69b) is infelicitous as the speaker could have used the copula (69a) instead of modal *moeten*.

(69) Objective information: there is no milk left in the package and the speaker says:

a. De melk is op.

*the milk is out*

'The milk is gone.'

b. #De melk moet op.

epistemic

*the milk must out*

Intended: 'The milk must be gone.'

If Small Clauses are special in that they carry objective evidence, it is surprising that they can combine with epistemic adverbs expressing a possibility such as *misschien* 'maybe' (70). Note moreover that a very similar thought, which can be expressed by the modal *kunnen* 'can' with a verbal complement (71a), can still not be expressed by the same modal with a non-verbal complement (71b). For me, sentence (70) and (71a) show that both under a Small Clause analysis and under a verbal analysis, there is a *syntactic* reason for the absence of an epistemic flavor, rather than a *semantic* one.

(70) De melk is misschien op.

*the milk is maybe out*

'The milk is maybe gone.'

- (71) a. De melk kan op zijn. ✓epistemic, ✓root

*the milk can out be*

'The milk could be gone.'

- b. De melk kan op. \*epistemic, ✓root

*the milk can out*

Intended: 'The milk could be gone.'

Eide (2005), finally, locates the lack of an epistemic flavor in the absence of Tense (or Mood) in the complement. She claims that epistemics, but not roots, need a finite complement, which is an effect of Tense (or Mood) (Holmberg & Platzack 1995). Her proposal is that epistemics range over assertions, while roots range over propositions, the difference being that assertions are located at a specific point in time, while propositions consist merely of subject-predicate relations. As such, assertions need Tense (or Mood), while propositions do not.<sup>44</sup>

While infinitival complements such as (72) may seem to cause a problem for this proposal, as epistemic modals often occur with this type of complement, Eide hypothesizes that infinitival complements can become finite 'by inheritance' because of the finiteness of the epistemic modal itself (Eide 2005:307). Non-verbal

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<sup>44</sup> Note that this does not mean that Eide supports the generalization central in this thesis, namely, that epistemic modals combine with a TP while root modals do not. Eide claims that epistemic modals can scope both above and below tense and that "it seems futile at best to seek the once-and-for-all ordering of epistemic modals w.r.t. to one or two fixed tense projections" (Eide 2005:310).

complements, on the other hand, cannot become finite and as such, cannot give rise to an epistemic flavor of the modal.

(72) Mary may be in Paris.

Eide's proposal cannot directly be carried over for my analysis as I assume there is an underlying verb in the complement, which possibly makes the complement 'finite by inheritance'. I too claim however that Tense is the category that (a) is necessary for an epistemic flavor to arise, and (b) is missing in the non-verbal complements.

#### 4.5.2. The absence of the epistemic flavor under a verbal analysis

In the first half of this chapter I argued that Dutch fits in with Rubinstein's generalization, as Dutch modals with non-verbal complements can be used to express a deontic flavor, and are underlyingly verbal. The minimal size of Dutch modals combining with a PP, AP, or NP is as such a vP, and in chapter 1 and 2 I argued that it is in fact an AspP. I have not said anything, however, about the maximal size of the complement – could it be bigger than a AspP?

(73) Mijn grootouders moeten **een hek**. Dutch

*my grandparents must a fence*

i. #My grandparents must have a fence (they're very private people).' \*epistemic

ii. 'My grandparents must have a fence (the mayor tells them to).' ✓deontic

- iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).' ✓teleological

In order to explain the absence of the epistemic flavor in sentences like (73), I propose that the maximum size of the complement is smaller than a TP. After all, in chapter 1 and 2 I argued that Dutch epistemic modals take a bigger sized complement than Dutch root modals take: While epistemic modals need a TP-complement as they scope over the tense in their complement, root modals scope under tense and therefore, take a complement smaller than a TP. If the complement in (73) is smaller than a TP, the complement is too small for an epistemic flavor to arise.

Evidence from chapter 2 for the fact that Dutch epistemics scope over tense is in (74): Dutch epistemics pass Ter Beek's Past Tense Replacement Test (Ter Beek 2008), in that a past tense adverbial phrase like *toen Marie binnenkwam* 'when Mary entered' can have a simultaneous reading with the complement of epistemic modals. The complement thus needs to contain a semantic past tense (and not an aspect) as only the simple past in Dutch licenses this interpretation when combined with a past tense adverbial phrase.

- (74) Jan moet de afwas hebben gedaan **toen Marie binnenkwam**. epistemic  
*Jan must the dishes have done when Marie entered*  
 'Jan must have been washing the dishes when Marie came in.' (Ter Beek 2008:109)

The same diagnostic can be used to show that the complements like the one in (73) do not contain tense. If the non-verbal complement would be as large as a TP



(75), an interpretation with a semantic past tense, like in (74), should be available when the same temporal adverbial phrase is present. Sentence (76) shows that the addition of this temporal adverbial phrase is impossible for modals with non-verbal complements to begin with.

(75) [de auto [vP moet [TP [AspP [vP *t* een wasbeurt HEBBEN GEHAD]]]]

*the car must a cleaning have had*

(76) \*De auto moet **een wasbeurt** **toen Marie binnenkwam**.

*the car must a washing when Mary entered*

In sum, while (73) is more similar to (77) on an epistemic interpretation of the modal than the surface structure indicates, there is still a difference: While the complement in (77) is the size of a TP (78a), the complement in (73) is the size of AspP (78b), which is smaller than TP, which explains why an epistemic flavor is available in (77), but not in (73).

(77) Mijn grootouders moeten **een hek hebben**. Dutch

*my grandparents must a fence have*

i. 'My grandparents must have a fence (they're very private people).' ✓epistemic

ii. 'My grandparents must have a fence (the mayor tells them to).' ✓deontic

iii. 'My grandparents must have a fence (in order to keep the wild animals off their land).'

✓teleological

(78) a. [mijn grootouders<sub>i</sub> [vP moeten [TP *t* een hek hebben]]] ✓epistemic

*my grandparents must a fence have*

- b. [mijn grootouders<sub>t</sub> [vP moeten [AspP [vP *t* een hek HEBBEN]]]] \*epistemic  
*my grandparents must a fence have*

In the next and final section, I will discuss the last open question of this chapter: What exactly is a covert verb, such as *HEBBEN* 'have' in (78b), and is there any independent evidence for their presence in Dutch?

#### 4.6. Covert verbs in Dutch

In this final section I will delve into further details of the unpronounced verb that I claim is present in the complement of Dutch modals (79). Barbiers (1995) raises important questions about the status of a covert verb, and while I will not be able to provide a full account, in section 4.6.1. I will argue that there are restrictions on the interpretation of sentences with covert verbs that provide insight into their semantics. In section 4.6.2. I will briefly discuss another phenomenon that seems to involve a covert verb, which provide further support for the – at first perhaps unlikely – idea that Dutch has one or more covert verbs in its lexicon.

- (79) a. [Mijn grootouders<sub>t</sub> [vP moeten [AspP [vP *t* een hek HEBBEN]]]  
*my grandparents must a fence HAVE*
- b. [De muur<sub>t</sub> [vP moet [AspP [vP *t* blauw WORDEN]]]  
*the wall must blue BECOME*
- c. [Jan<sub>t</sub> [vP kan [AspP [vP *t* naar huis GAAN]]]  
*Jan can to house GO*

#### 4.6.1. The status of covert verbs

As mentioned in section 4.3.2.4., one of Barbiers (1995, 2002) arguments against a covert verb analysis is that it is unclear what this covert verb is. Is covert *GAAN* 'go' like overt *gaan* 'go'? If not, what is it like instead? While I will not be able to give a precise account of covert verbs and their licensing conditions, I will narrow down their status in two ways: First, following Van Riemsdijk (2002, 2009), I will claim that covert verbs are not simply unpronounced versions of Dutch overt verbs. Second, while their meaning is more general than any overt verb in the Dutch lexicon, there are limitations on how sentences with covert verbs can be interpreted. This shows that their meaning is restricted, either lexically or by the syntactic structure it is in.

Concerning the first point, Van Riemsdijk (2002), in response to Barbiers (1995) argues that covert verbs are not like overt verbs. Barbiers (1995) provides sentences like (80) and (81) as arguments against a covert verb: If covert *GAAN* 'go' is merely the unpronounced version of overt *gaan* 'go', should they not be available in exactly the same sentences? In (80), overt *gaan* is possible but this verb cannot be left unpronounced. In (81), a possibly covert verb cannot be pronounced – none of the potential candidates for this sentence with an overt verb (*go*, *be*, *do*, *become*) fits in with this sentence.

(80) Deze maatregel moet vandaag in \*(gaan).

*This measure must today in go*

‘This measure must be effective as from today.’ (Barbiers 1995:153)

(81) Jan kan zijn werk niet aan #GAAN/#ZIJN/#DOEN/#WORDEN.

*Jan can his work not on GO BE DO BECOME*

‘John cannot cope with his work.’

(Barbiers 1995: 152)

Van Riemsdijk (2002:153) responds by stating that it is not necessary for the covert verb *GAAN* to be exactly like the Dutch overt verb *gaan*.<sup>45</sup> It can have the exact right interpretation for modals with an apparent PP-complement. In fact, one of Barbiers's further arguments against a covert verb analysis highlights a first difference between a covert verb and its closest overt counterpart (82). Barbiers claims that besides simple verbs, more complex verb phrases would need to be able to be covert as a passive interpretation is available (82a). No simple overt verb is able to express this meaning. If a complex verb phrase like the passive *worden gedaan* 'be done' is allowed, however, it remains unexplained why the passive *by*-phrase is licensed with an overt verbal complex (82b), but not with a covert verbal complex (82c).

- (82) a. Deze lampen moeten uit #GAAN/#ZIJN/WORDEN GEDAAN.

*These lights must out GO BE BECOME DONE*

‘These lights must be switched off.’

(Barbiers 1995:151)

- b. Deze lampen moeten uit worden gedaan door Jan.

*These lights must out become done by Jan*

‘These lights must be switched off by John.’

- c. Deze lampen moeten uit (\*door Jan).

*These lights must out by Jan*

‘These lights must be switched off by John.’

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<sup>45</sup> Van Riemsdijk furthermore suggests that it is impossible to delete *gaan* in (80) because it falls under Fiengo's Generalization (1980): This generalization states that the verbal part of particle verbs cannot be empty or deleted. I claim elsewhere that a similar analysis is available for (81) (van Dooren 2014): The verb here is the particle verb *aan-kunnen* ‘to cope with’, which explains why adding a second verbal element is infelicitous.

Van Riemsdijk (2002:153) suggests that the paradigm in (82) shows that the covert verb *GAAN* 'go' that is present in (82a) inherently implies an external agent, unlike overt *gaan* 'go'. As such, (82a) is not a passive and is therefore not expected to license a *by*-phrase. Van Riemsdijk (2002:163) thus states that covert *GAAN* 'go' has its own lexical entry.

A second difference between covert and overt verbs is in (83). I claim that the meaning of a covert verb is more general than any of the overt verbs in Dutch. For modals combining with what looks like an NP, as in (83), the interpretation is generally possessive, but the best fitting verb might be either *hebben* 'have', *krijgen* 'get' or *nemen* 'take' (cf. Schwarz 2007 on *need*, Biberauer & Oosthuizen 2011 for meaning flexibility in modals with CP-complements in Afrikaans).

- (83) Jan moet een rode trui/ een contract/een douche.  
*Jan must a red sweater/ a contract/a shower*  
 'John needs to HAVE a red sweater, GET a contract, TAKE a shower.'

For the modals combining with what looks like a PP, the overall interpretation is that of a motion verb (84), and for modals combining with what looks like an AP, the relation is predicative (85). Slight variations between *worden* 'become' and *zijn* 'be' are again possible for (85).

- (84) De vaas moet naar zolder/op de kast/terug.  
*the vase must to attic on the closet back*

'The vase needs to GO in the attic, GO on the closet, GO back.

(85) De muur moet blauw/gestuukt/gestipt.

*the wall must blue/ plastered/spotted*

'The wall must BECOME blue/GET plastered/BE spotted.'

The interpretation thus has to be quite general. Does this mean that any interpretation is available, and should we consider an analysis in which the meaning of the covert verb is merely filled in by the context? I will argue that there are restrictions on the covert verb that do not come from the context, but instead are either (a) lexically specified, or (b) determined by the syntactic structure the verb is in.

One instance of a limitation on the interpretation of the covert verb is in (86). Sentence (86a), with an NP-like complement, cannot have a predicative interpretation. Even given a plausible context, this sentence cannot mean 'John needs to *become* a doctor'. Likewise, a movement interpretation is unavailable: Sentence (86b) cannot mean 'John needs to *go* to the swimming pool'. The same holds for modals with AP and PP-complements: Sentence (87a) cannot have a possessive interpretation such as 'the wall must have some blue on it', it can only mean that it needs to become blue (completely), showing it gets a predicative interpretation. Modals with PP-complements, finally, get a movement interpretation, since (87b) cannot have a possessive interpretation such as 'the dog needs to get a house'.

(86) a. Jan moet een dokter.

*Jan must a doctor*

'John must get a doctor.'

b. Jan moet een zwembad.

*Jan must a swimming-pool*

'John must get a swimming pool.'

(87) a. De muur moet blauw.

*the wall must blue*

'The wall must become blue.'

b. De hond moet naar huis.

*the dog must to house*

'The dog must go home.'

It is remarkable that there are such constraints on the interpretation of the sentence depending on the category of the complement. Two analyses come to mind: First, it could be that there are three separate verbs in the lexicon (either with or without phonetic content, cf. section 4.3.2.2). There is a motion verb that takes a PP complement, a predicative verb that takes an AP, and a possessive verb that takes an NP (88). A second option is that there is only one verb in the lexicon that gets one of these three interpretations depending on the type of complement it combines with (88). I will have to leave it for future research to determine how we can decide between these two options.

(88) a. [Mijn grootouders<sub>t</sub> [<sub>VP</sub> moeten [<sub>AspP</sub> [<sub>VP</sub> *t* een hek HEBBEN]]]

*my grandparents must a fence HAVE*

b. [De muur<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* blauw WORDEN]]]

*the wall must blue BECOME*

- c. [Jan<sub>t</sub> [<sub>VP</sub> kan [<sub>AspP</sub> [<sub>VP</sub> *t* naar huis GAAN]]]
- Jan can to house GO*
- (89) a. [Mijn grootouders<sub>t</sub> [<sub>VP</sub> moeten [<sub>AspP</sub> [<sub>VP</sub> *t* een hek V]]]
- my grandparents must a fence V*
- b. [De muur<sub>t</sub> [<sub>VP</sub> moet [<sub>AspP</sub> [<sub>VP</sub> *t* blauw V]]]
- the wall must blue V*
- c. [Jan<sub>t</sub> [<sub>VP</sub> kan [<sub>AspP</sub> [<sub>VP</sub> *t* naar huis V]]]
- Jan can to house V*

#### 4.6.2. Covert verbs in a different phenomenon

In this final section I will discuss another context in which covert verbs seem to show up in Dutch, displaying very similar properties to the covert verbs discussed in the previous section. This suggests that they are more generally available in Dutch, although the specific licensing conditions need to be left for future research.

When a speaker is telling a story, he or she can utter (90) and leave out the verb *gaan* 'go' (van Dooren, *in progress*).

- (90) (Context: I'm telling a story about what happened after people recommended me and a friend a particular movie)
- Dus wij (gaan) naar de bioscoop.
- so we go to the cinema*
- 'So we went to the cinema.'

As in the modal case, there are two structural analyses for sentences like (90): In the underlying structure, is there verbal material (91a), or not (91b)? In the latter



case, the analysis would be one of a Small Clause capturing the subject-predicate relation.

(91) Dus wij naar de bioscoop.

*so we to the cinema*

a. [Dus wij [AspP [vP ~~wij~~ GAAN naar de bioscoop]]

b. [Dus wij [SC ~~wij~~ naar de bioscoop]]

I claim that the structure in (91a) is correct given that manner adverbs can again be attached to these sentences (92).

(92) (Context: People recommended me and a friend a particular movie. The path to the movie was dangerous, according to the people who talked to us. I'm telling a story about what happened.)

Dus wij **voorzichtig** naar de bioscoop.

*so we carefully to the cinema*

'So we carefully went to the cinema.'

The similarities between the modal case and the story-telling case are remarkable: Besides PPs, NPs (93) and APs (94) are available. The interpretation of the covert verb is similar: In the case of a PP, the interpretation is one of a motion verb, while the interpretation in the case of an NP is possessive, and in the case of an AP is predicative.

(93) (Context: I'm telling a story about someone recommending me getting a life insurance)

Dus wij een levensverzekering.

*so we a life.insurance*

'So we got a life insurance.'

(94) (Context: I'm telling a story about someone trying to bake a cake. The mixer spun out of control and the batter exploded against the wall!)

Die hele muur vies.

*that whole wall dirty*

'The whole wall became dirty.'

There is furthermore no mix-and-match situation: While one can imagine (95) having a predicative interpretation ('John became a lawyer'), this interpretation is not available. The only interpretation that is available is possessive.

(95) (Context: I'm telling a story about John getting arrested)

Dus Jan een advocaat.

*so Jan a lawyer*

'So John got a lawyer.'

What is different between the modal case and the story-telling case is the circumstances under which the covert verb appears: The modal case does not involve telling a story, and the story-telling case does not need to involve a modal. What is more, the context of telling a story alone is not sufficient: There furthermore needs to be a common ground. Sentence (96) shows that a very bleached context, in which

only the topic of the story is mentioned, is sufficient for the surface string to be without an overt verb, as long as the audience already knows the background to the story (context provided by Max Papillon). If new information is provided, as in (97), sentences without an overt verb are however infelicitous.<sup>46</sup>

- (96) (Context: Everyone knows John had an interview, but they don't know the outcome.)

*Dus die Jan hè, hij naar het interview.*

*so that John PRT he to the interview*

'So that guy John, right, he went to the interview.'

- (97) (Context: Everyone knows John had an interview, but only the speaker knows the outcome.)

*#Dus die Jan hè, hij een nieuwe baan.*

*so that John PRT he a new job*

'So that guy John, right, he got a new job.'

Since this sentence type is available in Dutch, but not in English, it could provide further support for the existence of covert verbs in the lexicon of Dutch. More research needs to be done on why these verbs are available in modal contexts and story-telling contexts, and whether there is a common source that licenses their use.

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<sup>46</sup> Note that this final restriction does not suggest that there is actual ellipsis involved: The verb *gaan* 'go' does not need to have been used in the lead up to the story to make (96) felicitous.

#### 4.7. Conclusion

This chapter started out with a seeming cross-linguistic split between languages in which modals with non-verbal complements can and cannot be used to express a deontic flavor. Dutch *moeten* 'must' can be used to express a deontic flavor when it combines with an NP-complement (98a), a PP-complement, and an AP-complement, but Hebrew *Xayav* 'need, must' with an NP-complement, and *English* 'need' with an NP-complement (as well as Hindi-Urdu modals, see fn. 39), cannot. I have argued that in the Dutch sentences, a covert verb is present, which makes the complement verbal underlyingly (98b). Some evidence presented in favor of the presence of covert verbs in Dutch is that they seem to occur in different contexts as well. The three languages discussed in this chapter thus show a cross-linguistically uniform pattern: Only when the complement of a modal is verbal can it be used to express a deontic flavor. If the complement is truly non-verbal, as in Hebrew and English, only a teleological flavor is available.

- (98) a. Mijn grootouders moeten **een hek**.                      \*epistemic ✓deontic ✓teleological  
      *my grandparents must a fence*  
      'My grandparents must have a fence.'
- b. [mijn grootouders<sub>i</sub> [vP moeten [AspP [vP *t* een hek HEBBEN]]]]                      \*epistemic  
      *my grandparents must a fence have*

A follow-up question to this conclusion is why Dutch modals with non-verbal complements are still limited in the types of flavors they can express. If the complement in (98) is underlyingly verbal, why can the modal not be used to express

an epistemic flavor, as in the case of a complement with an overt verb (99)? My analysis here is that while the complement in (98) is verbal, it is not the same size as the complement in (99) on an epistemic reading of the modal. Epistemic modals need a complement the size of a TP, and since the complement in (98) is smaller than a TP, it explains the absence of an epistemic flavor.

- (99) a. Mijn grootouders moeten **een hek hebben**. ✓epistemic, ✓deontic, ✓teleological  
*my grandparents must a fence have*  
 'My grandparents must have a fence.'
- b. [mijn grootouders<sub>t</sub> [vP moeten [TP [AspP [vP *t* een hek hebben]]]]] ✓epistemic  
*my grandparents must a fence have*

In the next and final chapter, I will bring the results from this chapter together with the issues discussed in the previous chapters and look at the results from a broader perspective. What insights have we gained so far, and where should we go from here?

## Chapter 5: Conclusion

There are two main claims to this thesis. I argued that in one sense, Dutch modals are different from modals studied in other languages, such as English and French: Dutch modals are genuine verbs, and not functional items or auxiliaries. In another sense, however, Dutch modals are similar to modals studied in other languages in that modal flavor is restricted by the syntactic environment the modal is in. Together, the Dutch data challenge current theories on how modal flavor is restricted by syntax, and provide support in favor of my alternative restrictions that are based on the modal's *complement size*. In what follows, I will elaborate on each of these claims, after which I discuss some unresolved issues and future avenues.

### 5.1. Dutch epistemics: Similar to yet different from English and French modals

There is a longstanding debate in the literature about whether epistemics in various languages scope above tense (Groenendijk & Stokhof 1975, Iatridou 1990, Stowell 2004, Condoravdi 2002, Hacquard 2006, 2010, a.o.), or below tense (von Stechow & Gillies 2007, Rullmann & Matthewson 2018). For English, French and Dutch, the datapoints themselves are disputed (see for instance Hacquard 2006, Laca 2008, Martin 2008, Ter Beek 2008, Aelbrecht 2010, Rullmann & Matthewson 2018): Are sentences like (1) interpreted as an epistemic claim that holds *at* speech time (epistemic > tense), or as an epistemic claim that held at a time *before* speech time (tense > epistemics)? (Note that this debate presupposes that there is only one tense in a modal sentence.)

- (1) Mary had to be home. (epistemic)
- Option i. 'Given what I *knew then*, it *was* necessary that Mary was home.' t>epi
- Option ii. 'Given what I *know now*, it *is* necessary that Mary was home.' epi>t

I argued that Dutch epistemics seemed to go against any attempt at a cross-linguistic generalization, as they seem to scope above *and* below tense (Ter Beek 2008, Aelbrecht 2010). The experiment on past tense modals in chapter 3 is in line with this conclusion. I argued that Dutch only appears to be a counterexample, however, and that the difference in lexical status between Dutch modals on the one hand, and English and French modals on the other, explain part of the tense patterns we find. Moreover, across all the three languages, we find the generalization that epistemics scope *over* tense.

I claim that Dutch epistemic modal sentences are biclausal, as opposed to monoclausal. Dutch modals are verbs inside a verb phrase, and project their own functional projections, among which is tense. This makes it possible for the Dutch modal to scope under the tense of its own clause (2a). However, Dutch epistemic modals can also scope above tense, namely, the tense of their complement, because they take a TP complement (2b).

- (2) a. [TP **past tense** [vP modal [TP [vP verb ]]]]
- b. [TP [vP modal [TP **past tense** [vP verb ]]]]

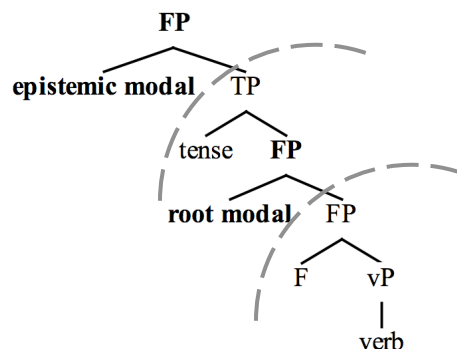
English and French epistemic modal sentences are in contrast monoclausal: Following Cinque (1999), epistemic modals are in a functional projection above the

verb phrase, which means they do not have their own functional projections. The results from the experiment in chapter 3 support the claim that these epistemics cannot scope under tense. Therefore, French and English modals are located in a functional projection above tense. Here, they can only scope over tense, namely, the tense of their complement (3).

- (3) [FP epistemic modal [TP past tense [vP verb ]]

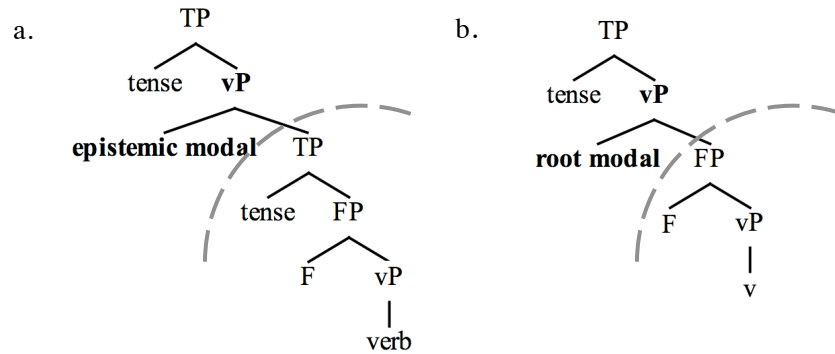
I thus claim that modals can differ in lexical status cross-linguistically, which explains why Dutch epistemics, but not French or English epistemics, can scope under tense. What ties epistemic modals together is the type of *complement* that they take (see also Ramchand 2014, Ramchand & Svenonius 2014): Regardless of whether epistemic modals are verbal or functional, epistemics scope *over* the tense of their complement (4)-(5a), indicated by the dashed line (in line with Cinque 1999, Hacquard 2006; contra Rullmann & Matthewson 2018). Root modal verbs, on the other hand, take an untensed complement, which explains why they only scope under tense: Root modal sentences do not take a tensed complement, and as such, they can only scope under the tense of their own clause (5b).

- (4) functional modals





(5) modal verbs



5.2. Dutch roots: Similar yet different to Hebrew modals

The second challenge that Dutch modals pose for current theories arises from modals combining with a non-verbal complement. In contrast to modals with verbal complements, modals with non-verbal complements are restricted in the flavors they can express. Based on data from Hebrew, English *need* and Hindi-Urdu, Rubinstein (2012) claims that modals with an NP-complement cannot have a *deontic* flavor. Instead, only a goal-oriented or *teleological* flavor is available (6b).

- (6) a.  $\chi$ ayav-im livnot kan gader.  $\checkmark$ epistemic,  $\checkmark$ deontic,  $\checkmark$ teleological  
*must-M.PL build.INF here fence*  
 'A fence needs to be built here.'
- b.  $\chi$ ayav-im kan gader.  $\ast$ epistemic,  $\ast$ deontic,  $\checkmark$ teleological  
*must-M.PL here fence*  
 'We need a fence here.'

Rubinstein states that cross-linguistically, only modals with a verbal complement can have a deontic interpretation, while teleological modals are not

restricted in the same way. Dutch appears to go against this cross-linguistic restriction, however, as Dutch modals with a non-verbal complement can always have a deontic flavor, along with a teleological flavor.

- (7) Mijn grootouders moeten een hek.  
*my grandparents must a fence*  
 'My grandparents must have a fence.' \*epistemic, ✓deontic, ✓teleological

I argued that, despite appearances, Dutch does not falsify Rubinstein's generalization. Based on a novel argument involving manner adverbs, I claimed that Dutch fits in with the generalization that deontics have to combine with a verbal phrase, since underlyingly, the modal complement in (7) contains an underlying verb (8).

- (8) [Mijn grootouders<sub>i</sub> moeten [<sub>AspP</sub> [<sub>vP</sub> een hek **V**]]]  
*my grandparents must a fence*

My analysis in (8) has implications for a second restriction on modals with non-verbal complements, one that has to do with the absence of epistemic flavor. If an underlying verb is present, which makes the complement highly similar to complements with an overt verb, why can the modal still not have an epistemic flavor, as shown in (7)? Previous analyses of this restriction all focus on the absence of the verb in (8) (Barbiers 1995, Eide 2005, Constantinescu et al. 2012), and as such do not carry over. My explanation is that even though the complement is verbal, it is

still too small for an epistemic flavor to arise: it is smaller than a TP, namely, an AspP (8). Since epistemics take a TP-complement, an AspP-complement is too small for an epistemic modal to arise, unlike the TP-complement that epistemic modals take (9).

- (9) [Mijn grootouders, moeten [<sub>TP</sub> een hek hebben]]] ✓<sub>epistemic</sub>  
*my grandparents must a fence have*

### 5.3. Proposal: Modals are specified for flavor and complement size

Together, the two case studies provide evidence for three cross-linguistic generalizations in which *complement size* restricts the availability of modal flavor: Epistemic modals need to combine with a Tense Phrase (in line with Cinque 1999, Hacquard 2006); deontics need to combine with an Aspectual Phrase (building on Rubinstein 2012), while teleologicals can combine with a smaller-sized complement. In contrast to previous proposals, in which flavor restrictions are linked to the structural height of functional items (Cinque 1999, Hacquard 2006), a proposal based on complement size applies both to functional items *and* modal verbs (see Ramchand 2014, Ramchand & Svenonius 2014 for a similar proposal). The proposal advanced in this thesis thus accounts for why cross-linguistically, epistemics can scope *over* tense while roots can only scope *under* tense. It also accounts for why deontics – as well as epistemics (Barbiers 1995) cannot combine with a non-verbal complement; in such cases, underlying structure still includes the relevant material.

In order to capture the syntactic restrictions on modal flavor, I propose to specify modal force, modal flavor, and complement type in separate entries for each

modal. While letting go of a unified account for modals, I maintain the part of Kratzer's (1977, 1981) context-dependency in modals that determines the various subflavors of root modals.

Two questions still remain: *Why* do epistemic modals need a TP-complement, and *why* do deontics need an AspP-complement? By replacing a unified account of modals by three separate generalizations, I invite questions about why the generalizations are this way, and not another way. A related question concerns the learnability of a system like this: How does it prevent children from acquiring a system in which root modals for instance take a TP-complement? Observing this directly from the input might be difficult, especially when the form of the root and the epistemic modal is identical, and different underlying structures can appear identical on the surface. My proposal here appeals to something similar to Cinque's hierarchy: despite superficial differences, languages converge on the same restrictions between modal flavor and modal complement. If the generalizations that I propose hold across all languages, then they may be something that learners expect, and do not have to discover.

#### 5.4. Further issues and future avenues of research

There are important limitations to the results of my dissertation, as well as at least two unresolved issues. I will discuss these below, which automatically leads to a number of extensions that my work can lead to.

#### 5.4.1. Limitations on the experiment on past tense epistemics

The results from the experiment in chapter 3 are encouraging for my proposal that syntactic restrictions on modal flavor depend on (a) the lexical category (modal verbs vs. functional modals), and more importantly, (b) the complement size. This proposal predicts that root modals can never scope over tense, epistemic modal verbs can scope both *under* the tense of their own clause, and *over* the tense of their complement, and epistemic functional modals can only scope *over* the tense of their complement. There are a number of limitations of both the experimental set-up and the results that prevent me from drawing strong conclusions, however. First of all, I only investigated three languages: English, French, and Dutch. Since the experiment is relatively easy to translate, in the future it would be profitable to include more languages, thereby consistently testing the interaction between tense and modals across languages. A second limitation is that I only tested one modal per language: *have to* for English, *moeten* for Dutch, and *devoir* for French. Whether or not we can compare the results from the three languages thus depends on whether the modals are similar enough to compare them. At the end of chapter 3, I raised the issue of whether *have to* might have different contextual restrictions which influenced the results. What is more, I only looked at necessity modals so far, given that the only English modal that carries tense is *have to*. My proposal predicts however that existential modals pattern the same: This can be investigated by means of a follow-up on Dutch *kunnen* ‘can’ and French *pouvoir* ‘can’, which both carry tense. Finally, our results indicate that overall, none of the epistemic modal sentences we tested were perfectly acceptable, irrespective of temporal perspective. This is an interesting result in its

own right: What is the difficulty with sentences like *it had to be raining last night*? Could it be due to a preference for sentences like *it has to have been raining/it must have been raining* (or even *it was probably raining*)? Could it be because of the mismatch between spell-out and interpretation, with the morpheme *on* the modal being interpreted *under* the modal? An interesting follow-up could be to find out whether there are any processing difficulties with these sentences, similar to processing difficulties with scope reversal in quantifiers (Anderson 2004) (Gillian Ramchand, p.c.). Since sentences with a past tense epistemic are so rare in at least child-directed speech (chapter 3), it would moreover be an interesting, though challenging, test to find out what a child's interpretation of these sentences is. Do they come with expectations of how these sentences are interpreted or not?

#### 5.4.2. Limitations on the modal flavors discussed

In this thesis, I focused on epistemic, deontic, and teleological modals: The distinction between epistemics on the one hand, and deontics/teleologicals on the other hand (grouped together as 'roots') showed the interaction between modals and tense, which lead to the generalization that epistemics, but not roots, take a tensed complement. The distinction between deontics and teleologicals was relevant because Rubinstein (2012) proposed that deontics, but not teleologicals, need a verb in their complement. There is no need to stop here, however: How about ability (10) and bouletic modal flavors (11)? What are their restrictions?

(10) Mary can ride a bike.

(11) I have to have that car!

A first thing to note is that all non-epistemic flavors are normally grouped together as *roots*. We thus expect them to behave like roots when it comes to tense. The real question thus is, do they behave like deontics, in that they need a verbal complement, or like teleologicals, which can take a smaller sized complement? Based on my argument concerning manner adverbs, we can infer that at least ability modals accept complements smaller than a verbal complement: Ability modals can combine with NP-complements in Dutch, and manner adverbs can only modify the modal, not the complement (12). More research is necessary to include the other flavors.

- (12) Jan kan snel een liedje. ability  
*Jan can quickly a song*  
 i. 'Jan quickly learns how to sing a song.'  
 ii. # 'Jan knows how to sing a song quickly.'

#### 5.4.3. Limitations on the complements discussed: CPs

In chapter 1, I briefly discussed modals with CP-complements. For the most part, I left this type of complement out of my thesis, as the data I have access to does not lead to a clear cross-linguistic pattern. Here is the puzzle:

Rubinstein (2012) discusses Hebrew modals with CP-complements besides NP-complements (chapter 4) and shows that neither of them can be used to express a deontic flavor. The data on CP-complements is given in (13). As with an NP-complement, the sentence is judged *false* in this context as it only has a teleological and not a deontic interpretation.

(13) City regulations mandate that home owners put up fences between their properties.

You and your neighbor get along very well without a fence. In fact, both of you object to a fence because it would have to go right on top of the beautiful flower beds that have been flourishing between your two properties. You say to your neighbor:

Xayav-im [Se-tihye kan gader]. (Rubinstein 2012: 172)

*must-M.PL that-be.Fut.F.SG here fence*

‘A fence is needed here.’

If what matters for deontics is that there is a verb in their complement, we would expect deontics to be able to take a CP-complement. Since they do not, Rubinstein makes the generalization that NP and CP-complements are in some sense similar to each other and different from infinitival complements. Only infinitival complements license a deontic flavor. The hypothesis that NP and CP-complements are similar runs into two problems when we look past Hebrew, however: First, Dutch modals with CP-complements can have an epistemic, a deontic, and a teleological flavor (14).

(14) a. Het moest haast wel [dat Charlotte de cake had opgegeten]. epistemic

*it must.PST almost prt that Charlotte the cake had up.eaten*

‘It almost had to be the case that Charlotte had eaten the cake.’ (Aelbrecht

2010:42)

b. [Dat zo’n kunstwerk verloren gaat] mag echt niet. deontic

*that such.a art.piece lost goes may really not*

‘That such a piece of art is lost, that really should not be allowed.’ (Aelbrecht



- c. Maar het mag van mij [dat er nu 3 spelers bij komen].<sup>47</sup> deontic  
*but it may from me that there now 3 players with come*  
 'But I allow there to be three extra players now.' (<https://www.boerenmacht.nl/index.php/tim-sparv-dicht-bij-een-overgang-naar-fc-groningen>)

The presence of a deontic flavor could be explained by extending the analysis I gave for Dutch modals with NP-complements: What we find is that in Hebrew, neither modals with an NP nor with a CP-complements can have a deontic flavor, but in Dutch, both modals can. Underlyingly, the Dutch complements could both be verbal, with a covert verb like *HEBBEN* 'have' when the modal combines with an NP, and a covert verb like *GEBEUREN* 'happen' (15), which selects for the CP-complement (15b).

- (15) a. Maar het mag van mij [CP dat er nu 3 spelers bij komen.]  
 b. Maar het mag van mij [AspP GEBEUREN [CP dat er nu 3 spelers bij komen.]]  
*but it may from me happen that there now 3 players with come*

The real problem is the epistemic flavor, however: If what licenses an epistemic flavor is another covert verb inside a TP-complement, it raises the question of why this option is available for Dutch modals with a CP-complement, but not for Dutch modals with a PP, NP, or AP-complement; recall that modals with these complements cannot have an epistemic flavor (Barbiers 1995).

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<sup>47</sup> Note that Zwart (2011:162) claims sentences like these are degraded (marked with two question marks).

A further issue arises when we take Bosnian-Croatian-Serbian into account. Based on data concerning negation, tense, and agreement, Veselinović (2019) claims that a CP-complement is the only available option for epistemic modals (16).

- (16) Mora-Ø                      bi-ti        da    je                      Ana u biblioteci.                      BCS
- must-3SG.PRS be-INF    DA be.IPF.PRS.3SG Ana in library*
- ‘Ana must be in the library.’                      (epistemic) (Veselinović 2019:51)

An overview of the facts discussed so far is presented in Table 1. As things stand, there is no obvious cross-linguistic pattern. One option to capture the variation in the empirical patterns is to investigate whether the CPs in Hebrew, Dutch, and BCS differ in certain ways. Thus, the pattern could be explained if for some reason the CPs in Dutch and BCS count as verbal, thereby licensing epistemic and deontic modal flavors, while the CP in Hebrew does not count as verbal.

Table 1: Possible flavors for modals with a CP-complement

modal Language	Epistemic	root	
		deontic	teleological
Hebrew	*	*	✓
Dutch	✓	✓	✓
BCS	✓	*	*

#### 5.4.5. Limitations on the tense/aspect forms discussed: Modals in the perfect

In chapter 2, I discussed two combinations of Dutch modals and potential tense markers that argued for a difference between epistemics and roots. Dutch modals in the past tense, as well as Dutch modals with *hebben* 'have' as part of their complement, are interpreted differently based on whether the modal has an epistemic or a root flavor, with root modals scoping *under* tense, and epistemic modals being able to scope *over* tense. There is a third combination of modals and a potential tense marker, however, which are modals in the perfect form (17).

- (17) Jan heeft thuis moeten/kunnen zijn. (epistemic)

*Jan has home must.INF can.INF be*

'Jan has had to/could have been be home.'

Boogaart (2007) claims that while modals tend to be interpreted as root modals when they occur in the perfect form (cf. Barbiers 1995, Eide 2011 for a similar observation for Norwegian), there are naturally occurring cases in which the modal has an epistemic flavor (18). Boogaart notes, however, that the temporal properties are unexpected: In (18), the evaluation time of *moeten* in (18a) and *kunnen* in (18b) is at speech time (cf. Vikner 1988 for Danish, Eide 2004, 2011 for Norwegian), while the event under the modal is shifted to the past. This contrasts with (19), when the modal has a root flavor, and the obligation held at a point in the past.

- (18) a. Hij heeft veel onderzoek **moeten** doen voor dat boek.

*he has much research must do for that book*

‘He must have done a lot of research for that book.’ (Boogaart 2007:63)

b. De kleding van Rembrandt in films is bijvoorbeeld niet historisch correct, maar

*the clothes from Rembrandt in movies is for instance not historically correct, but*

een uitvinding die suggereert zo heeft het **kunnen** zijn.

*an invention that suggests so has it can.INF be*

'The clothes from Rembrandt in movies is for instance not historically correct, but

an invention that suggests 'it could have been this way'.

(<https://scripties.uba.uva.nl/download?fid=515623>)

(19) Jan heeft thuis moeten/ mogen zijn. (root)

*Jan has home must.INF may.INF be*

'Jan was required/allowed been be home.'

Boogaart claims that epistemic modals that are embedded under a perfect are 'exactly like the interpretation of the present tensed modals with a perfect complement' (Boogaart 2007:64), as in (20).

(20) a. Hij **moet** veel onderzoek hebben gedaan voor dat boek.

*he must much research have done for that book*

‘He must have done a lot of research for that book.’

b. (...) een uitvinding die suggereert zo **kan** het zijn geweest.

*an invention that suggests so can it be been*

'an invention that suggests 'it could have been this way'.

Up to this point, the data seem very similar to the data discussed in chapter 2. We see one form, a modal in the perfect form, and depending on whether the modal

has an epistemic or a root flavor, the scopal interaction is different, with epistemic modals scoping *over* the perfect, and root modals scoping *under* the perfect. This raises a number of additional questions. First, it is unclear how to treat the perfect syntactically in Dutch. The perfect is a combination of a present tense auxiliary, and a past participle. If the perfect is located in a TP, we have our explanation of why epistemics can scope over the perfect: Only epistemic modals take a TP-complement, and as such, despite the spell-out of the perfect *above* the modal, it is actually interpreted *below* the modal, shifting the event under the modal to the past. If the perfect is located in an AspP, however, I do not expect to find a difference, as both roots and epistemics have an AspP in their complement.

Boogaart's explanation for the unexpected pattern is that it is a matter of *coercion*: He claims that there is a semantic problem for epistemic modals occurring in the perfect, which is why they tend to have a root interpretation. Cooperative hearers of sentences like (18) will therefore resort to an interpretation that is semantically possible, which is one in which the epistemic has a present evaluation time. What exactly is the problem with epistemic occurring in the perfect? Boogaart claims that epistemics are peculiar in that they need to be interpreted as simultaneous to a special type of reference time, an epistemic evaluation time. Imperfective aspect generally provides a past reference time, which Boogaart extends to an epistemic evaluation time, while perfective aspect does not provide a reference time (Berthonneau & Kleiber 1993). While perfects like (21) introduce a reference time, it is a present reference time, which is not simultaneous to the participle, here *gedaan*

'done'. In case the participle is an epistemic, as in (18), this means the requirement of the epistemic modal is not met.

- (21) Hij **heeft** veel onderzoek **gedaan** voor dat boek.

*he has much research done for that book*

'He has done a lot of research for that book.'

If the unexpected interpretation of (18) is a matter of coercion on the hearer's side, the question that remains (and is also raised by Boogaart (2007:64)) is as to why speakers use these sentences and not sentences like (20).

An interesting case that I will also have to leave for future research is whether epistemic modals and *seem* behave differently in the perfect: In chapter 3, I compared epistemic modals in the past tense with *seemed*, and showed that they behave differently. A comparison between (18) above and sentence like (22), in which *heeft geleken* 'has seemed' is interpreted as a past likelihood, suggests that a similar difference is present. The reason why I am reluctant to make a stronger claim is that the verb here takes a CP-complement, which may make a difference; sentences with *heeft geleken* 'has seemed' and a TP-complement are however questionable (23).

- (22) Het heeft geleken alsof het ging regenen (maar uiteindelijk bleef het droog).

*it has seemed as.if it went rain but eventually stayed it dry*

'It seemed as if it was going to rain (but it stayed dry in the end).'

- (23) ??Het heeft lijken te regenen (maar uiteindelijk bleef het droog).

*it has seemed to rain but eventually stayed it dry*

#### 5.4.3. Limitations on the items discussed

A final limitation I want to mention concerns the items I looked at. In this thesis, I discussed modal verbs and functional modals. There are, however, related questions in the literature on attitude verbs: For attitude verbs, too, different complements have been linked to meanings, with a verb like *want* taking complements that are different from the complements that a verb like *believe* takes (White et al. 2017, Bolinger 1968; Dixon 2010 for a typological perspective; De Villiers 2005, Hacquard & Lidz 2018 for an acquisitional perspective, a.o.). By extending our domain to include attitude verbs, we could further our understanding of how principled the link between modal meaning and type of complement is.

#### 5.5. Wrapping up

Despite the limitations mentioned above, we can end on a positive note: In this dissertation, I have argued for links between modal flavor and complement type that hold across languages. While languages may differ on the surface, I have tried to show that once we look closer, there are remarkable similarities underlyingly. Whether the similarities in complement type, which I have argued for, can be found in languages beyond the ones studied here, will have to be investigated in future research.

## Appendix A: Materials for the Acceptability Judgment Study

### English

#### ***Had to***

1. There had to be more than 100 people at the party last night, but now I know that/but I thought that there were fewer than 60.
2. The AC had to be broken in the rental where we stayed, but now I know that/but I thought that someone hadn't turned it on correctly.
3. The barking dogs had to be afraid of something last night, but now I know that/but I thought that their owner simply returned home.
4. Tyler's phone battery had to be dead after the long hike, but now I know that/but I thought that it was full.
5. The road had to be slippery this morning, but now I know that/but I thought that that was not the case.
6. The cat we got from the shelter had to be starving, but now I know that/but I thought that it had eaten too much.
7. It had to be snowing this morning, but now I know that/but I thought that it was raining.
8. The driver had to be at fault in last night's accident, but now I know that/but I thought that he wasn't.

#### ***Seemed***

1. There seemed to me to be more than 100 people at the party last night, but now I know that/but I thought that there were fewer than 60.
2. The AC seemed to me to be broken in the rental where we stayed, but now I know that/but I thought that someone hadn't turned it on correctly.
3. The barking dogs seemed to me to be afraid of something last night, but now I know that/but I thought that their owner simply returned home.
4. Tyler's phone battery seemed to me to be dead after the long hike, but now I know that/but I thought that it was full.
5. The road seemed to me to be slippery this morning, but now I know that/but I thought that that was not the case.
6. The cat we got from the shelter seemed to me to be starving, but now I know that/but I thought that it had eaten too much.
7. It seemed to me to be snowing this morning, but now I know that/but I thought that it was raining.
8. The driver seemed to me to be at fault in last night's accident, but now I know that/but I thought that he wasn't.

#### ***Fillers***

1. I thought that it was going to be sunny, and indeed, the weather is great/it is raining a lot.
2. I thought that Ben was a vegetarian, and indeed, he doesn't eat meat/ he eats a lot of meat.
3. I thought that I had forgotten my umbrella, and indeed, I had left it at home/ I had it with me.
4. I thought that Mina was in the garden, and indeed, she was picking flowers/she was in the bathroom.
5. I thought that there was a mosquito in the room, and indeed, I got bitten everywhere/ it was just a fly.
6. I thought that the package would arrive yesterday, and indeed, it arrived on Monday/ it hasn't arrived yet.
7. I thought that Al had two children, and indeed, he has twins/ he has only one child.
8. I thought that Aaron was American, and indeed, he was born in New York/ he is Italian.



## *French*

### Devait

1. Il devait y avoir plus de 100 personnes à la fête hier soir, mais maintenant je sais qu'/mais je pensais qu'il y en avait moins de 60.
2. La clim du gîte où nous étions devait être cassée, mais maintenant je sais que/mais je pensais que quelqu'un ne l'avait pas allumée correctement.
3. Les chiens devaient avoir peur de quelque chose hier soir, mais maintenant je sais que/ mais je pensais que leur propriétaire rentrait simplement chez lui.
4. La batterie de Tyler devait être complètement vide après sa longue randonnée, mais maintenant je sais qu'/ mais je pensais qu'elle était pleine.
5. La route devait être glissante ce matin, mais maintenant je sais qu'/ mais je pensais qu'elle ne l'était pas.
6. Le chat adopté du refuge devait être affamé, mais maintenant je sais qu'/ mais je pensais qu'il avait trop mangé.
7. Il devait neiger ce matin, mais maintenant je sais qu'/ mais je pensais qu'il pleuvait.
8. Le conducteur devait être en faute pour l'accident hier soir, mais maintenant je sais qu'/ mais je pensais qu'il ne l'était pas.

### Semblait

1. Il me semblait y avoir plus de 100 personnes à la fête hier soir, mais maintenant je sais qu'/ mais je pensais qu'il y en avait moins de 60.
2. La clim du gîte où nous étions me semblait être cassée, mais maintenant je sais que/ mais je pensais que quelqu'un ne l'avait pas allumée correctement.
3. Les chiens me semblaient avoir peur de quelque chose hier soir, mais maintenant je sais que/ mais je pensais que leur propriétaire rentrait simplement chez lui.
4. La batterie de Tyler me semblait être complètement vide après sa longue randonnée, mais maintenant je sais qu'/ mais je pensais qu'elle était pleine.
5. La route me semblait être glissante ce matin, mais maintenant je sais qu'/ mais je pensais qu'elle ne l'était pas.
6. Le chat adopté du refuge me semblait être affamé, mais maintenant je sais qu'/ mais je pensais qu'il avait trop mangé.
7. Il me semblait neiger ce matin, mais maintenant je sais qu'/ mais je pensais qu'il pleuvait.
8. Le conducteur me semblait être en faute pour l'accident hier soir, mais maintenant je sais qu'/mais je pensais qu'il ne l'était pas.

## *Dutch*

### Moest

1. Er moesten meer dan 100 mensen zijn op het feest gisteravond, maar nu weet ik dat/maar ik dacht dat er minder dan 60 waren.
2. De airconditioning van het vakantiehuisje waar we verbleven moest stuk zijn, maar nu weet ik dat/maar ik dacht dat iemand hem verkeerd had ingesteld.
3. De blaffende honden moesten ergens bang voor zijn gistermiddag, maar nu weet ik dat/maar ik dacht dat hun baasje thuiskwam.
4. Jans telefoon moest leeg zijn na de lange wandeltocht, maar nu weet ik dat/maar ik dacht dat hij nog opgeladen was.
5. Het wegdek moest glad zijn vanmorgen, maar nu weet ik dat/maar ik dacht dat dat niet het geval was.
6. De kat die we uit het asiel hadden gehaald moest uitgehongerd zijn, maar nu weet ik dat/maar ik dacht dat ze juist teveel had gegeten.
7. Het moest aan het sneeuwen zijn vanmorgen, maar nu weet ik dat/maar ik dacht dat het aan het regenen was.
8. De bestuurder moest schuldig zijn aan het ongeluk vannacht, maar nu weet ik dat/maar ik dacht dat dat niet het geval was.

## Leek

1. Er leken me meer dan 100 mensen te zijn op het feest gisteravond, maar nu weet ik dat/maar ik dacht dat er minder dan 60 waren.
2. De airconditioning van het vakantiehuisje waar we verbleven leek me stuk te zijn, maar nu weet ik dat/maar ik dacht dat iemand hem verkeerd had ingesteld.
3. De blaffende honden leken me ergens bang voor te zijn gistermiddag, maar nu weet ik dat/maar ik dacht dat hun baasje thuiskwam.
4. Jans telefoon leek me leeg te zijn na de lange wandeltocht, maar nu weet ik dat/maar ik dacht dat hij nog opgeladen was.
5. Het wegdek leek me glad te zijn vanmorgen, maar nu weet ik dat/maar ik dacht dat dat niet het geval was.
6. De kat die we uit het asiel hadden gehaald leek me uitgehongerd te zijn, maar nu weet ik dat/maar ik dacht dat ze juist teveel had gegeten.
7. Het leek me aan het sneeuwen te zijn vanmorgen, maar nu weet ik dat/maar ik dacht dat het aan het regenen was.
8. De bestuurder leek me schuldig te zijn aan het ongeluk vannacht, maar nu weet ik dat/maar ik dacht dat dat niet het geval was.

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